2.0 Facilities and Operations

LANL has more than 2,000 structures with approximately eight million square feet under roof, spread over an area of approximately 40 square miles. In order to present a logical and comprehensive evaluation of LANL's potential environmental impacts, the SWEIS developed the Key Facility concept. Fifteen facilities were identified that were both critical to meeting mission assignments and

- housed operations that have potential to cause significant environmental impacts, or
- were of most interest or concern to the public (based on comments in the SWEIS public hearings), or
- would be more subject to change because of DOE programmatic decisions.

The remainder of LANL was called "Non-Key," not to imply that these facilities were any less important to accomplishment of critical research and development, but because they did not fit the above criteria (DOE 1999a).

Taken together, the 15 Key Facilities represent the great majority of environmental risks associated with LANL operations. Specifically, the SWEIS projected that the Key Facilities would contribute

- more than 99 percent of all radiation doses to the public,
- more than 90 percent of all radioactive liquid waste generated at LANL,
- more than 90 percent of all radioactive solid waste generated at LANL,
- more than 99 percent of all radiation doses to the LANL workforce, and
- approximately 30 percent of all chemical waste generated by LANL.

Offsite and Onsite Doses

Table 2.0-1 compares the actual maximum offsite doses to the SWEIS projections. As expected, the doses vary from the projection because the pit production mission has not reached maturity. Table 2.0-1 presents the readily available calendar year radiation doses, estimated and actual, to the public from LANL operations. These data have not been captured by facility for the SWEIS Yearbooks.

Table 2.0-1. Maximum Offsite Dose Estimates (mrem)

MAXIMUM OFFSITE DOSE	SWEIS ROD	1998	1999	2000	2001	2002
Estimate	5.44	1.72	0.32	0.65	1.9	1.6
Actual	---	1.72	0.32	0.65	1.84	1.69

Occupational radiation exposures for workers at LANL from CY 1998 through CY 2002 are summarized in Table 2.0-2. The collective Total Effective Dose Equivalent, or collective TEDE, for the LANL workforce during 2002 was 164 person-rem, considerably lower than the workforce dose of 704 person-rem projected for the ROD.

Table 2.0-2. Radiological Exposure to LANL Workers

PARAMETER	UNITS	SWEIS ROD	VALUE FOR 1998	VALUE FOR 1999	VALUE FOR 2000	VALUE FOR 2001	VALUE FOR 2002
Collective TEDE (external + internal)	person-rem	704	161	131	196	113	164
Number of workers with non-zero dose	number	3,548	1,839	1,427	1,316	1,332	1696
Average non-zero dose:							
• external + internal radiation exposure	millirem	Not projected	87.4	92	149	85	96
• external radiation exposure only	millirem	Not projected	Not projected	90	65	83	95

Comparison with the Projected TEDE in the ROD. In addition to being less than the collective TEDE levels in 1993–1995, the collective TEDE for 2002 is less than the TEDE projected in the ROD. The implementation of war reserve pit manufacture, which was approved in the ROD, has not become fully operational at LANL. This contributed to lower doses than projected. The collective dose may increase once the pit manufacture program is fully implemented.

Collective TEDEs for Key Facilities. In general, collective TEDEs by Key Facility or technical area are difficult to determine because these data are collected at the group level, and members of many groups and/or organizations receive doses at several locations. The fraction of a group's collective TEDE coming from a specific Key Facility or technical area can only be estimated. For example, personnel from the Health Physics Operations group and Johnson Controls Northern New Mexico (JCNNM) are distributed over the entire Laboratory, and these two organizations account for a significant fraction of the total LANL collective TEDE.

Radioactive Waste Generation

Tables 2.0-3 through 2.0-8 compare the actual waste generation volumes to the SWEIS projections. As expected, the volumes vary from the projections because the pit production mission has not reached maturity. Please note that the Facility and Waste Operations (FWO) database has been improved and adjusted for waste generator variances.

Table 2.0-3 shows the total amount of radioactive liquid waste treated at LANL. The facilities contributing liquid waste to the Radioactive Liquid Waste Treatment Facility (RLWTF), located at TA-50, can be found in the Annual Reports generated by the RLWTF operating group. Inspection of these reports substantiates the projection of greater than 90 percent of all radioactive liquid waste being generated by the 15 Key Facilities. (The most recent report is LANL 2003.)

Tables 2.0-4 through 2.0-8 show the solid radioactive waste data by Key Facility. The solid radioactive waste data are presented by individual types (LLW, mixed LLW [MLLW], TRU, and Mixed TRU) and summarized overall. Percentage comparisons have been given with and without environmental restoration because the environmental restoration contribution was an unknown at the time of the SWEIS publication.

Chemical Waste Generation

The chemical waste generated by Key Facility is summarized in Table 2.0-9. As with the solid radioactive waste, percentage comparisons have been given with and without environmental restoration because the environmental restoration contribution was an unknown at the time of the SWEIS publication.

Table 2.0-3. Radioactive Liquid Waste Treated at LANL

WASTE TREATMENT ACTIVITY	SWEIS ROD	1998	1999	2000	2001	2002	TOTAL (1998–2002)
Pretreatment of radioactive liquid waste at TA-21	900,000 liters/yr	370,000 liters	45,000 liters	45,000 liters	457,000 liters	30,300 liters	947,300 liters
Percentage of SWEIS projection of pretreatment at TA-21	-	41%	5%	5%	51%	3%	21%
Pretreatment of radioactive liquid waste from TA-55	80,000 liters/yr	39,000 liters	Less than 80,000 liters	9,000 liters	22,000 liters	35,400 liters	Less than 185,400 liters
Percentage of SWEIS projection of pretreatment from TA-55	-	49%	Less than 100%	11%	28%	44%	46%
Solidification of transuranic (TRU) sludge at TA-50	3 m^3/yr	None	5 m^3	5 m^3	None	None	10 m^3
Percentage of SWEIS projection of solidification of TRU sludge	-	0%	167%	167%	0%	0%	67%
Radioactive liquid waste treated at TA-50	35,000,000 liters/yr	23,000,000 liters	20,000,000 liters	19,000,000 liters	14,000,000 liters	11,500,000 liters	87,500,000 liters
Percentage of SWEIS projection of radioactive liquid waste treated at TA-50	-	66%	57%	54%	40%	33%	50%
De-water low-level radioactive waste (LLW) sludge at TA-50	10 m^3/yr	28 m^3	37 m^3	48 m^3	60 m^3	10 m^3	183 m^3
Percentage of SWEIS projection of LLW sludge de-watered at TA-50	-	280%	370%	480%	600%	100%	366%
Radioactive liquid waste treated at TA-53	Not Projected	[a]	[a]	[b]	[b]	243,000 liters	NA
Percentage of SWEIS projection of radioactive liquid waste treated at TA-53	NA	NA	NA	NA	NA	NA	NA

[a] Records of flows into the TA-53 lagoons started in CY 2000.
[b] The first records of flows into the TA-53 RLWTF were reported in the 2002 annual report (LANL 2003).

Table 2.0-4. Low-Level Waste Generation at LANL by Facility (in m^3/yr)

FACILITY	SWEIS ROD	1998	1999	2000	2001	2002	TOTAL (1998–2002)
2.1 Plutonium Complex	754	238	345	199	300	296.3	1,378.30
2.2 Tritium Facility	480	46	47	49	0	90	232.00
2.3 Chemistry and Metallurgy Research (CMR) Building	1,820	124	184	264	448	389	1,409.00
2.4 Pajarito Site	145	4	31.3	14	13	0	62.30
2.5 Sigma Complex	960	3	61	52	0.5	202	318.50
2.6 Materials Science Laboratory (MSL)	0	0	0	0	0	0	0.00
2.7 Target Fabrication Facility (TFF)	10	0	0	0	0.2	0.4	0.60
2.8 Machine Shops	606	27	40.4	409	22	44	542.40
2.9 High Explosives Processing	16	6	8.3	3	1	8.69	26.99
2.10 High Explosives Testing	940	0	0.01	0.6	0	0	0.61
2.11 Los Alamos Neutron Science Center (LANSCE)	1,085	16	70	28	0.1	0	114.10
2.12 Bioscience Facilities	34	7	14	0	0	0	21.00
2.13 Radiochemistry Facility	270	89	44	57	55	34	279.00
2.14 RLWTF	160	132	175	132	517	193	1,149.00
2.15 Solid Radioactive and Chemical Waste Facilities	174	15	21	13	14	35	98.00
Total of LLW for Key Facilities	7,454	707	1,042.01	1,221.60	1,406.80	1,292.39	5,669.80
2.16 Non-Key Facilities	520	386	350	2,781	569	534	4,620
Total of LLW for Key and Non-Key Facilities	7,974	1,092	1,392.01	4,002.60	1,975.80	1,826.39	10,288.80
Percentage of Total from Key Facilities	93.5%	65.7%	74.8%	43.9%	71.2%	70.8%	55.1%
2.17 Environmental Restoration (ER) Project	4,260	744	286	226	621	5,484	7,361
Total of LLW for Non-Key Facilities and ER Project	4,780	1,130	636	3,007	1,190	6,018	11,981
Total LLW = Key + Non-Key and ER Project	12,234	1,837	1,678.01	4,228.60	2,596.80	7,310	17,650.41
Percentage of Total from Key Facilities	60.9%	38.5%	62.1%	28.9%	54.2%	17.7%	32.1%

Table 2.0-5. Mixed Low-Level Waste Generation at LANL by Facility (in m^3/yr)

FACILITY	SWEIS ROD	1998	1999	2000	2001	2002	TOTAL (1998–2002)
2.1 Plutonium Complex	13	1.3	3.9	1.75	12.6	3.34	22.89
2.2 Tritium Facility	3	0.1	0	0	0.01	0.8	0.91
2.3 CMR Building	19	3.2	0.4	0.3	0.4	0.9	5.2
2.4 Pajarito Site	1.5	0	7.9	0	0	0	7.9
2.5 Sigma Complex	4	0	0.3	0	1.3	0	1.6
2.6 MSL	0	0	0	0	0	0	0
2.7 TFF	0.4	0	0	0	0	0	0
2.8 Machine Shops	0	0.1	0.03	0.12	0.05	0	0.3
2.9 High Explosives Processing	0.2	0	0	0	0	0	0
2.10 High Explosives Testing	0.9	0	0	0	0	0	0
2.11 LANSCE	1	0.4	0.5	4.9	0.2	0.9	6.9
2.12 Bioscience Facilities	3.4	0	0.01	0	0	0	0.01
2.13 Radiochemistry Facility	3.8	0.3	0.6	1.6	2.8	2.2	7.5
2.14 RLWTF	0	1.3	3.2	2.5	2.6	3.7	13.3
2.15 Solid Radioactive and Chemical Waste Facilities	4	0	0	0	0	0	0
Total of MLLW for Key Facilities	54.2	6.8	16.9	11.13	19.97	11.84	66.64
2.16 Non-Key Facilities	30	55.4	2.5	10.1	9.4	8.7	86.1
Total of MLLW for Key and Non-Key Facilities	84.2	62.2	19.4	21.23	29.37	20.54	152.74
Percentage of Total from Key Facilities	64.4%	10.9%	87.1%	52.4%	68.0%	57.6%	43.6%
2.17 ER Project	548	9.2	1.25	577	28.86	0	616.31
Total of MLLW for Non-Key and ER Project Facilities	578	64.6	3.75	587.1	38.26	8.7	702.41
Total MLLW = Key + Non-Key and ER Project Facilities	632.2	71.4	20.65	598.23	58.23	20.54	769.05
Percentage of Total from Key Facilities	8.6%	9.5%	81.8%	1.9%	34.3%	57.6%	8.7%

Table 2.0-6. TRU Waste Generation at LANL by Facility (in m^3/yr)

FACILITY	SWEIS ROD	1998	1999	2000	2001	2002	TOTAL (1998–2002)
2.1 Plutonium Complex	237	73.3	94	54.1	35.6	40.6	297.9
2.2 Tritium Facility	0	0	0	0	0	0	0
2.3 CMR Building	28	12.7	8.9	24.8	46.5	10.2	103.1
2.4 Pajarito Site	0	0	0	0	0	0	0
2.5 Sigma Complex	0	0	0	0	0	0	0
2.6 MSL	0	0	0	0	0	0	0
2.7 TFF	0	0	0	0	0	0	0
2.8 Machine Shops	0	0	0	0	0	0	0
2.9 High Explosives Processing	0	0	0	0	0	0	0
2.10 High Explosives Testing (Listed as TRU/Mixed TRU)	0.2	0	0	0	0	0	0
2.11 LANSCE	0	0	0	0	0	0	0
2.12 Bioscience Facilities	0	0	0	0	0	0	0
2.13 Radiochemistry Facility	0	0.2	0	0	0	0	0.2
2.14 RLWTF	30	1	0	16.1	0.4	1.9	19.4
2.15 Solid Radioactive and Chemical Waste Facilities	27	20.9	39.9	27.1	9.7	29.5	127.1
Total of TRU Waste for Key Facilities	322.2	108.1	143.2	122.1	92.2	82.2	547.8
2.16 Non-Key Facilities	0	0	0	2.7	24.8	36.8	64.3
Total of TRU Waste for Key and Non-Key Facilities	322.2	108.1	143.2	124.8	117.0	119.1	612.2
Percentage of Total from Key Facilities	100.0%	100.0%	100.0%	97.8%	78.8%	68.9%	89.5%
2.17 ER Project	11	0	0	0	0	0	0
Total of TRU Waste for Non-Key and ER Project Facilities	11	0	0	2.7	24.8	36.8	64.3
Total TRU = Key + Non-Key and ER Project Facilities	333.2	108.1	143.2	124.8	117.0	119.1	612.2
Percentage of Total from Key Facilities	96.7%	100%	100%	97.8%	78.8%	69.0%	89.5%

Table 2.0-7. Mixed TRU Waste Generation at LANL by Facility (in m^3/yr)

FACILITY	SWEIS ROD	1998	1999	2000	2001	2002	TOTAL (1998–2002)
2.1 Plutonium Complex	102	16.8	66	16.8	29.6	54.9	184.1
2.2 Tritium Facility	0	0	0	0	0	0	0
2.3 CMR Building	13	15.8	1.9	1	0.8	16.7	36.2
2.4 Pajarito Site	0	0	0	0	0	0	0
2.5 Sigma Complex	0	0	0	0	0	0	0
2.6 MSL	0	0	0	0	0	0	0
2.7 TFF	0	0	0	0	0	0	0
2.8 Machine Shops	0	0	0	0	0	0	0
2.9 High Explosives Processing	0	0	0	0	0	0	0
2.10 High Explosives Testing (Listed as TRU/Mixed TRU)	0.2	0	0	0	0	0	0
2.11 LANSCE	0	0	0	0	0	0	0
2.12 Bioscience Facilities	0	0	0	0	0	0	0
2.13 Radiochemistry Facility	0	0	0	0	0	0	0
2.14 RLWTF	0	1.4	4.8	0	4.4	0.2	10.8
2.15 Solid Radioactive and Chemical Waste Facilities	0	0	0	7.8	13.1	15.1	36
Total of Mixed TRU Waste for Key Facilities	115.2	34.0	72.2	25.6	47.9	86.8	266.5
2.16 Non-Key Facilities	0	0	15	63	0	0.21	78.21
Total of Mixed TRU Waste for Key and Non-Key Facilities	115.2	34.0	87.2	88.6	47.9	87.01	344.71
Percentage of Total from Key Facilities	100.0%	100.0%	83.8%	28.9%	100.0%	99.8%	77.3%
2.17 ER Project	0	0	0	0	0.2	0	0.2
Total of Mixed TRU Waste for Non-Key and ER Project Facilities	0	0	15	63	0.2	0.21	78.41
Total Mixed TRU = Key + Non-Key and ER Project	115.2	34.0	87.2	88.6	48.1	87.01	344.91
Percentage of Total from Key Facilities	100%	100%	82.8%	28.9%	99.6%	99.8%	77.3%

Table 2.0-8. Overall Solid Radioactive Waste Generation at LANL (in m^3/yr)

FACILITY	SWEIS ROD	1998	1999	2000	2001	2002	TOTAL (1998–2002)
Total of LLW for Key Facilities	7,454.0	707	1,042.01	1,221.6	1,406.80	1,292.39	5,669.80
Total of MLLW for Key Facilities	54.2	6.8	16.9	11.3	19.97	11.84	66.64
Total of TRU for Key Facilities	322.2	108.1	143.2	122.1	92.2	82.2	547.8
Total of Mixed TRU for Key Facilities	115.2	34	72.2	25.6	47.9	86.8	266.5
Total Radioactive Solid Waste for Key Facilities	7,945.6	855.9	1,274.31	1,380.60	1,566.87	1,473.23	6,550.74
Total LLW from Non-Key Facilities	520	386	350	2,781	569	534	4,620
Total MLLW from Non-Key Facilities	30	55.4	2.5	10.1	9.4	8.7	86.1
Total TRU from Non-Key Facilities	0	0	0	2.7	24.8	36.8	64.3
Total Mixed TRU from Non-Key Facilities	0	0	15	63	0	0.21	78.21
Total Radioactive Solid Waste from Non-Key Facilities	550	441.4	367.5	2,857	603.2	579.71	4,849
Total Radioactive Solid Waste for Key and Non-Key Facilities	8,495.6	1,297.3	1,641.81	4,237.6	2,170.07	2,052.94	11,399.74
Percentage of Total Radioactive Solid Waste from Key Facilities	93.5%	66.0%	77.6%	32.6%	72.2%	71.8%	57.5%
Total LLW from ER Project	4,260	744	286	226	621	5.484	7,361
Total MLLW from ER Project	548	9.2	1.25	577	28.86	0	616.31
Total TRU Waste from ER Project	11	0	0	0	0	0	0
Total Mixed TRU Waste from ER Project	0	0	0	0	0.2	0	0.2
Total Radioactive Solid Waste from ER Project	4,819	753.2	287.25	803	650.06	5,484	7,978
Total Radioactive Solid Waste from All Facilities	13,315	2,050.5	1,929.06	5,040.6	2.820.13	7,536.94	19,377.74
Percentage From Key Facilities	59.7%	41.7%	66.1%	27.4%	55.6%	19.5%	33.8%

Table 2.0-9. Chemical Waste Generated at LANL by Facility (in kg/yr)

FACILITY	SWEIS ROD	1998	1999	2000	2001	2002	TOTAL (1998–2002)
2.1 Plutonium Complex	8,400	10,861	2,538	1,563	11,709	14,243	40,914
2.2 Tritium Facility	1,700	195	30	10	2,615	5,164	8,014
2.3 CMR Building	10,800	3,313	4,824	1,837	676	707	11,357
2.4 Pajarito Site	4,000	3,127	1,707	127	91	82	5,134
2.5 Sigma Complex	10,000	22,489	3,208	3,672	1,265	32,397	63,031
2.6 MSL	600	244	154	881	255	149	1,683
2.7 TFF	3,800	2,827	594	1,062	668	904	6,055
2.8 Machine Shops	474,000	4,399	3,955	887	26,474	2,023	37,738
2.9 High Explosives Processing	13,000	12,237	13,329	1,032,985	375,283	15,109	1,448,943
2.10 High Explosives Testing	35,300	444	1,015	60,437	1,337	1,285	64,518
2.11 LANSCE	16,600	55,258	11,060	1,205	4,057	1,999	73,579
2.12 Bioscience Facilities	13,000	2,368	1,691	2,370	1,359	4,504	12,292
2.13 Radiochemistry Facility	3,300	1,990	1,513	12,461	17,725	186,135	219,824
2.14 RLWTF	2,200	384	201	384	68,792	1,143	70,904
2.15 Solid Radioactive and Chemical Waste Facilities	920	327	30	806	449	863	2,475
Total of Chemical Waste for Key Facilities	597,620	120,462	45,848	1,120,688	512,756	266,707	2,066,461
2.16 Non-Key Facilities	651,000	1,506,392	765,395	367,768	1,254,680	334,348	4,228,583
Total of Chemical Waste for Key and Non-Key Facilities	1,248,620	1,626,854	811,243	1,488,456	1,767,436	601,055	6,295,044
Percentage of Total from Key Facilities	47.9%	7.4%	5.7%	75.3%	21.2%	44.4%	32.8%
2.17 ER Project	2,000,000	143,913	14,629,792	26,185,341	28,815,571	1,132,780	67,907,397
Total of Chemical Waste for Non-Key and ER Project Facilities	2,651,000	1,650,305	15,395,187	26,553,109	27,070,251	1,467,128	72,135,980
Total Waste = Key + Non-Key Facilities and ER Project	3,248,620	1,770,767	15,441,086	27,673,797	27,583,007	1,733,835	74,202,492
Percentage of Total from Key Facilities	18.4%	9.3%	0.3%	4.0%	1.9%	15.4%	2.8%

In addition, the Key Facilities (as presented in the SWEIS) comprised 42 of the 48 Category 2 and Category 3 Nuclear Structures at LANL.[1] Subsequently, DOE and LANL have published five lists identifying nuclear facilities at LANL [one in 1998 (DOE 1998a), another in 2000 (DOE 2000a), two in 2001 (LANL 2001a, b), and one in 2002 (LANL 2002a)] that significantly changed the classification of some buildings.

Nuclear and Radiological Facility Designations

Table 2.0-10 shows the nuclear facilities identified in the SWEIS and those identified in 2002 (LANL 2002a). Appendix B provides a summary of the nuclear facilities and a table has been added to each section of this chapter to explain the differences and identify the 23 structures currently listed by DOE as nuclear facilities. Of these 23 structures, all reside within a Key Facility. The only Non-Key Facility listed in 2001 was the former tritium research facility (TA-33-86), but the facility underwent decontamination and decommissioning in 2002, was demolished, and was removed from the nuclear facility list. Appendix C provides a comparison of the facilities identified as radiological when the SWEIS was prepared and those identified as radiological in 2001 and 2002 (LANL 2001c, 2002b). The 2001 and 2002 lists are shorter due to better guidance on the radiological designation.[2]

Definition of Key Facilities

The definition of each Key Facility hinges upon operations[3], capabilities, and location and is not necessarily confined to a single structure, building, or technical area. In fact, the number of structures comprising a Key Facility ranges from one, the MSL, to more than 400 for LANSCE. Key Facilities can also exist in more than a single technical area, as is the case with the High Explosives Testing and High Explosives Processing Key Facilities, which exist in all or parts of five and seven technical areas, respectively.

This chapter discusses each of the 15 Key Facilities from three aspects—significant facility construction and modifications, types and levels of operations, and operations data by calendar year from the publication of the SWEIS through 2002. Each of these three aspects is given perspective by comparing them to projections made by the SWEIS ROD. This comparison provides an evaluation of whether or not data resulting from LANL operations continue to fall within the environmental envelope established by the SWEIS ROD. It should be noted that construction activities projected by the SWEIS ROD were for the 10-year period 1996–2005. All construction activities will not be complete and projected operations may not reach maximum levels until the end of the 10-year period. Table 2.0-11 identifies the construction and modifications projected by the SWEIS ROD and what activity has occurred from 1998-2002. Table 2.0-12 summarizes the projected construction and modifications that have been completed. Table 2.0-13 summarizes the usage of capabilities by facility while Table 2.0-14 concentrates on those capabilities that have been inactive or lost. Table 2.0-15 provides an overview of emissions and solid waste while Table 2.0-16 summarizes flow from the permitted outfalls.

[1] DOE Order 5480.23 (DOE 1992a) categorizes nuclear hazards as Category 1, Category 2, or Category 3. Because LANL has no Category 1 nuclear facilities (usually applied to nuclear reactors), definitions are presented for only Categories 2 and 3:
• Category 2 Nuclear Hazard–has the potential for significant onsite consequences. DOE-STD-1027-92 (DOE 1992b) provides the resulting threshold quantities for radioactive materials that define Category 2 facilities.
• Category 3 Nuclear Hazard–has the potential for only significant localized consequences. Category 3 is designed to capture those facilities such as laboratory operations, LLW handling operations, and research operations that possess less than Category 2 quantities of material. DOE-STD-1027-92 (DOE 1992b) provides the Category 3 thresholds for radionuclides.
The identification of nuclear facilities is based upon the official list maintained by DOE Los Alamos Site Office as of December 2002 (LANL 2002a).

[2] Since the publication of the SWEIS, only two radiological facility lists have been published. The first (LANL 2001c) was published in 2001 and the second (LANL 2002b) in 2002.

[3] As used in the SWEIS and this Yearbook, facility operations include three categories of activities—research, production, and services to other LANL organizations. Research is both theoretical and applied. Examples include modeling (e.g., atmospheric weather patterns) to subatomic investigations (e.g., using the LANSCE linear accelerator [linac]) to collaborative efforts with industry (e.g., fuel cells for automobiles). Production involves delivery of a product to a customer, such as radioisotopes to hospitals and the medical industry. Examples of services provided to other LANL facilities include utilities and infrastructure support, analysis of samples, environmental surveys, and waste management.

Table 2.0-10. LANL Nuclear Facilities – SWEIS and 2002

KEY FACILITY	BUILDING	SWEIS		2002	
		FACILITY	HC	FACILITY	HC
2.1 Plutonium Complex	TA-55-4	Pu-238 Processing	2	TA-55 Plutonium Facility	2
	TA-55-41	Nuclear Material Storage	2		
2.2 Tritium Facilities	TA-16-205	Weapons Engineering Tritium Facility (WETF)	2	TA-16 WETF	2
	TA-16-205A	WETF	2		
	TA-16-450	WETF	2		
	TA-21-155	Tritium System Test Assembly (TSTA)	2	TSTA	2
	TA-21-209	Tritium Science and Fabrication Facility (TSFF)	2	TA-21 TSFF	2
2.3 CMR Building	TA-03-19 (actually TA-3-29)	Chemistry and Metallurgy Research Facility (CMR)	2	TA-03 CMR	2
2.4 Pajarito Site	TA-18-23	KIVA 1	2	TA-18 Los Alamos Critical Experiment Facility	2
	TA-18-26	Hillside Vault	2		
	TA-18-32	KIVA 2	2		
	TA-18-116	KIVA 3	2		
2.5 Sigma Complex	TA-03-66	44 metric tons of depleted uranium storage	3		
	TA-03-159	Thorium storage	3		
2.6 MSL					
2.7 TFF					
2.8 Machine Shops					
2.9 High Explosives Processing	TA-08-22	Radiography Facility	2		
	TA-08-23	Radiography Facility	2	Betaron Building	2
	TA-08-24	Isotope Building	2		
	TA-08-70	Experimental Science	2		
	TA-16-411	Intermediate Device Assembly	2		
2.10 High Explosives Testing					
2.11 LANSCE	TA-53-3M	Experimental Science	3		
				TA-53 1L Target	3
				TA-53 Lujan Center ER-1/2	3
				TA-53 Area A-6	3
2.12 Bioscience					
2.13 Radiochemistry Facility	TA-48-1	Radiochemistry and Hot Cell Facility	3	TA-48 Radiochemistry and Hot Cell Facility	3

Table 2.0-10. LANL Nuclear Facilities – SWEIS and 2002 (continued)

KEY FACILITY	BUILDING	SWEIS		2002	
		FACILITY	HC	FACILITY	HC
2.14 RLWTF	TA-50-1	Main Treatment Plant	2	Main Treatment Plant, pretreatment plant, decontamination operation	3
	TA-50-2	LLW Tank Farm		Low level liquid influence tanks, treatment effluent tanks, low level sludge tanks	3
	TA-50-66	Acid and Caustic Tank Farm		Acid and caustic waste holding tanks	3
	TA-50-90	Holding Tank		Holding Tank	3
2.15 Solid Radioactive and Chemical Waste Facilities	TA-50-37	Radioactive Materials, Research, Operations, and Demonstration (RAMROD)		TA-50 RAMROD	2
	TA-50-69	Waste Characterization, Reduction, and Repackaging (WCRR) Facility Building	2	TA-50 WCRR Facility	3
	TA-50-69 Outside	Nondestructive Analysis Mobile Activities		TA-50 External nondestructive analysis mobile activities outside TA-50-69	2
	TA-50-69 Outside			TA-50 External Drum staging/storage pad and waste container temperature equilibration activities outside TA-50-69	2
	TA-54 Area G	LLW Waste Storage/Disposal	2	TA-54 Storage and Disposal Facility (Area G)	2
	TA-54-33	TRU Drum Preparation	2	Transuranic waste storage fabric dome with TRU waste drum (TRU Waste Inspectable Storage Project [TWISP])	2
	TA-54-38	Radioactive Assay Nondestructive Testing (RANT) Facility	2	TA-54 RANT Facility	3
	TA-54-48	TRU Storage Dome	2		
	TA-54-49	TRU Storage Dome	2		
	TA-54-144	Shed	2		
	TA-54-145	Shed	2		
	TA-54-146	Shed	2		
	TA-54-153	Dome	2		
	TA-54-177	Shed	2		
	TA-54-226	Temporary Retrieval Dome	2		
	TA-54-229	Tension Support Dome	2		
	TA-54-230	Tension Support Dome	2		
	TA-54-231	Tension Support Dome	2		
	TA-54-232	Tension Support Dome	2		
	TA-54-283	Tension Support Dome	2		
	TA-54-Pad2	Storage Pad	2	Recovery of buried TRU waste (TWISP)	2
	TA-54-Pad3	Storage Pad	2		
	TA-54-Pad4	TRU Storage	2		

Table 2.0-10. LANL Nuclear Facilities – SWEIS and 2002 (continued)

KEY FACILITY	BUILDING	SWEIS		2002	
		FACILITY	HC	FACILITY	HC
2.16 Non-Key Facilities	TA-03-40	Physics Building	3		
	TA-03-65	Source Storage	2		
	TA-03-130	Calibration Building	3		
	TA-33-86	Former Tritium Research	3		
	TA-35-2	Nuclear Safeguards Research Facility	3		

Table 2.0-11. Projected Construction and Modifications in the SWEIS ROD

FACILITY	ROD PROJECTION	1998	1999	2000	2001	2002
2.1 Plutonium Complex	Renovation of the Nuclear Material Storage Facility (NMSF)		Design efforts halted.			
	Construction of a new administrative office building		Facilities Improvement Technical Support (FITS) building constructed.			
	Upgrades within Building 55-4 to support continued manufacturing at the existing capacity of 14 pits/year	Upgrades continued.	Upgrades continued.	Upgrades continued.	Upgrades continued.	
	Further upgrades for long-term viability of the facility and to boost production to a nominal capacity of 20 pits/year				CMR Replacement preconceptual design.	CMR Replacement design ongoing.
2.2 Tritium Facilities	Extend the WETF tritium operations into TA-16-450	Significant remodeling of TA-16-450 began.	Remodeling continued.	Remodeling completed.		
2.3 CMR Building	Phase I Upgrades to maintain safe operating conditions for 5 to 10 years	Five of the 11 Phase I Upgrades completed.	Six of the 11 Phase I Upgrades completed before re-baselining.			
	Phase II Upgrades (except seismic) to enable operations for an additional 20 to 30 years		Progress made on 3 of the original 13. before re-baselining.			
	Modifications for production of targets for the molybdenum-99 medical isotope					Incomplete; inactive project.
	Modifications for the recovery of sealed neutron sources					Incomplete; inactive project.
	Modifications for safety testing of pits in the Wing 9 hot cells					Incomplete; inactive project.
2.4 Pajarito Site	Replacement of the portable linac machine					Has not been replaced.
2.5 Sigma Complex	Replacement of graphite collection systems	Completed in 1998.				
	Modification of the industrial drain pipe		Completed in 1999.			
	Replacement of electrical components			Essentially completed.	Add-on assignments continue.	Add-on assignments continue

Table 2.0-11. Projected Construction and Modifications in the SWEIS ROD (continued)

FACILITY	ROD PROJECTION	1998	1999	2000	2001	2002
	Roof replacement	Work done in 1998.	Most of roof replacement done.	Additional work needed.	Additional work needed.	Additional work needed.
	Seismic upgrades	Not started.	Not started.	Not started.	Not started.	Not started.
2.6 MSL	Complete the top floor of the MSL	Unscheduled and not funded.	Unscheduled and not funded.	Unscheduled and not funded.	Unscheduled and not funded.	Unscheduled and not funded.
2.7 TFF	None projected					
2.8 Machine Shops	None projected					
2.9 High Explosives Processing	Construction of the High Explosive Wastewater Treatment Facility (HEWTF)	HEWTF, TA-16-508, became fully operational in 1997.				
	Modification of 17 outfalls and their elimination from the National Pollutant Discharge Elimination System (NPDES) permit	19 outfalls eliminated during 1997 and 1998.				
	Relocation of the Weapons Component Testing Facility		Completed before 1999.			
	TA-16 steam plant conversion	Satellite steam boilers placed in service in 1997 and central plant shutdown.				
2.10 High Explosives Testing	Dual-Axis Radiographic Hydrodynamic Test (DARHT) facility construction and modification	Construction of TA-15-312 continued.	Construction of TA-15-312 continued.	Construction of TA-15-312 completed.		DARHT construction completed.
2.11 LANSCE	Eliminate NPDES Outfall 03A-145 from the Orange Box Building	Eliminated in 1998.				
	Closure of two former sanitary lagoons	Sampling conducted in 1998.	Remediation started in 1999.	Characterization continued; south lagoon sludge and liner removed.	Data analysis and sampling continued.	Cleanup of north lagoon as Interim Action.
	Low-Energy Demonstration Accelerator (LEDA) to become operational in late 1998	Started high-power conditioning.	Maximum power achieved.	Operated.	Shutdown in December until funded.	Inactive until funded.
	Short-Pulse Spallation Source enhancements	Upgrades started.	Installation of new instruments began.	First phase of Proton Storage Ring Upgrade completed.	Proton Storage Ring completed; instruments commissioned.	Upgrades to ion source and 1L line in progress.
	One-megawatt target/blanket					Not completed and not funded.

Table 2.0-11. Projected Construction and Modifications in the SWEIS ROD (continued)

FACILITY	ROD PROJECTION	1998	1999	2000	2001	2002
	New 100-MeV Isotope Production Facility		Construction preparation began.	Construction began.	Facility completed; upgrades to beam line in progress.	Readiness Review planned for July 2003 and commissioning for October 2003.
	Long-Pulse Spallation Source (LPSS), including decontamination and renovation of Area A	Not completed and not funded.	Not completed and not funded.	Not completed and not funded.	Not completed and not funded.	Not completed and not funded.
	Dynamic Experiment Lab	Not started.	Not started.	Concept revised.		
	Los Alamos International Facility for Transmutation	Not completed and not funded.	Not completed and not funded.	Not completed and not funded.	Not completed and not funded.	Not completed and not funded.
	Exotic Isotope Production Facility	Not completed and not funded.	Not completed and not funded.	Not completed and not funded.	Not completed and not funded.	Not completed and not funded.
	Decontamination and renovation of Area A-East	Not completed.	Not completed.	Not completed.	Not completed.	Not completed.
2.12 Bioscience Facilities	None projected					
2.13 Radiochemistry Facility	None projected					
2.14 RLWTF	Replace influent underground storage tanks	Tank farm upgraded by replacing two of three underground storage tanks with four aboveground steel tanks in 1997.				
	Install an ultrafiltration/reverse osmosis (UF/RO) process	Process installed in 1998.	Process became operational in 1999.			
	Install nitrate reduction equipment	Equipment installed in 1998.	Equipment became operational.		Equipment removed from service.	

Table 2.0-11. Projected Construction and Modifications in the SWEIS ROD (continued)

FACILITY	ROD PROJECTION	1998	1999	2000	2001	2002
2.15 Solid Radioactive and Chemical Waste Facility	Four additional fabric domes for storage of retrieved TRU waste	Three domes constructed and usage of an existing dome changed.	Dome 54-375 completed.			
2.16 Non-Key Facilities	Atlas	Atlas Facility designed and construction began in 1996.	Construction continued in 1999.	Construction completed and major capacitor banks tested.	Readiness for operations in July 2001 and first experiments in September 2001; environmental assessment for relocation to Nevada Test Site	Atlas physically moved to Nevada Test Site before end of December 2002.

Table 2.0-12. Projected Construction and Modifications Completed 1998–2002

1998 OR EARLIER	1999	2000	2001	2002
High Explosives Processing: Construction of HEWTF at TA-16-1508	Plutonium Complex: Constructed FITS Building	Tritium Facilities: Remodel of TA-16-450 and connection to WETF		CMR: re-baseline upgrades (originally listed as Phase 1 and Phase 2 Upgrades)
High Explosives Processing: Modification of flows to 19 outfalls and elimination from NPDES permit	Sigma: Replacement of the graphite collection systems	Non-Key Facilities: Atlas facility in parts of five buildings		High Explosives Testing: DARHT completed
High Explosives Processing: TA-16 Central steam plant replacement	Sigma: Modification of the industrial drain system			LANSCE: New 100-MeV Isotope Production Facility
LANSCE: Modification of three outfalls at TA-53 and elimination from NPDES permit	Sigma: Replacement of electrical components			
RLWTF: Installation of four above-grade tanks for influent liquid waste	High Explosives Processing: Relocation of the Weapons Components Testing Facility			
Solid Radioactive and Chemical Waste Facilities: Construction of four additional fabric domes at Area G for TRU waste storage	LANSCE: making the LEDA operational			
	RLWTF: bringing the new UF/RO process on-line			
	RLWTF: bringing the nitrate reduction equipment on-line			
Projects Completed:				
6	8	2	0	4
Total Completed for 1998–2002: 20				

Table 2.0-13. Capabilities

FACILITY	CAPABILITY	1998	1999	2000	2001	2002
2.1 Plutonium Complex	Plutonium Stabilization	Active	Active	Active	Active	Active
	Manufacturing Plutonium Components	Inactive	Active below SWEIS ROD level	Active below SWEIS ROD level	Inactive	Inactive
	Surveillance and Disassembly of Weapons Components	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Actinide Materials and Science Processing, Research, and Development	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Fabrication of Ceramic-Based Reactor Fuels	Active	Active	Inactive	Inactive	Active
	Plutonium-238 Research, Development, and Applications	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Nuclear Materials Storage, Shipping, and Receiving	Active	Active	Active	Active	Active
2.2 Tritium Facilities	High-Pressure Gas Fills and Processing: WETF	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Gas Boost System Testing and Development: WETF	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Cryogenic Separation: TSTA	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Lost
	Diffusion and Membrane Purification: TSTA, TSFF, WETF	Active below SWEIS ROD level	Active below SWEIS ROD level	Inactive	Inactive	Inactive
	Metallurgical and Material Research: TSTA, TSFF, WETF	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Thin Film Loading: TSFF (WETF by 2001)	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Gas Analysis: TSTA, TSFF, WETF	Active	Active	Active	Active	Active
	Calorimetry: TSTA, TSFF, WETF	Active	Active	Active	Active	Active
	Solid Material and Container Storage: TSTA, TSFF, WETF	Active	Active	Active	Active	Active
2.3 CMR Building	Analytical Chemistry	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Uranium Processing	Inactive	Active	Active	Active	Active
	Destructive and Nondestructive Assay	Active below SWEIS ROD level	Active below SWEIS ROD level	Inactive	Inactive	Inactive
	Nonproliferation Training	Inactive	Active	Active and moved to Pajarito Site	Inactive at CMR	Active
	Actinide Research and Processing	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Fabrication and Metallography	Active below SWEIS ROD level	Inactive	Inactive	Inactive	Inactive
2.4 Pajarito Site	Dosimeter Assessment and Calibration	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Detector Development	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level

Table 2.0-13. Capabilities (continued)

FACILITY	CAPABILITY	1998	1999	2000	2001	2002
	Materials Testing	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Subcritical Measurements	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Fast-Neutron Spectrum	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Dynamic Measurements	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Skyshine Measurements	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Vaporization	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Irradiation	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Nuclear Measurement School	Inactive at Pajarito Site	Inactive at Pajarito Site	Inactive at Pajarito Site	Active	Inactive at Pajarito Site
2.5 Sigma Complex	Research and Development on Materials Fabrication, Coating, Joining, and Processing	Active	Active	Active	Active	Active
	Characterization of Materials	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active at Sigma except for “analyze up to 36 tritium reservoirs/yr”	Active at Sigma except for “analyze up to 36 tritium reservoirs/yr”
	Fabrication of Metallic and Ceramic items	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
2.6 MSL	Materials Processing	Active below SWEIS ROD level	Active	Active	Active	Active
	Mechanical Behavior in Extreme Environment	Active below SWEIS ROD level	Active	Active	Active	Active
	Advanced Materials Development	Active below SWEIS ROD level	Active	Active	Active	Active
	Materials Characterization	Active below SWEIS ROD level	Active	Active	Active	Active
2.7 TFF	Precision Machining and Target Fabrication	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Polymer Synthesis	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Chemical and Physical Vapor Deposition	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Characterization of Materials	Located at Sigma; not active at TFF	Located at Sigma; not active at TFF	Located at Sigma; not active at TFF	Active below SWEIS ROD level	Active below SWEIS ROD level
2.8 Machine Shops	Fabrication of Specialty Components	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Fabrication Utilizing Unique Materials	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level

Table 2.0-13. Capabilities (continued)

FACILITY	CAPABILITY	1998	1999	2000	2001	2002
	Dimensional Inspection of Fabricated Components	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
2.9 High Explosives Processing	High Explosives Synthesis and Production	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	High Explosives and Plastics Development and Characterization	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	High Explosives and Plastics Fabrication	Active	Active	Active	Active	Active
	Test Device Assembly	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Safety and Mechanical Testing	Active	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Research, Development, and Fabrication of High-Power Detonators	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
2.10 High Explosives Testing	Hydrodynamic Tests	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Dynamic Experiments	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Explosives Research and Testing	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Munitions Experiments	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	High-Explosives Pulsed-Power Experiments	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Calibration, Development, and Maintenance Testing	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Other Explosives Testing	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
2.11 LANSCE	Accelerator Beam Delivery, Maintenance, and Development	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Experimental Area Support	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Neutron Research and Technology	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Accelerator Transmutation of Wastes	Inactive	Inactive	Inactive	Inactive	Inactive
	Subatomic Physics Research	Active	Active	Active	Active	Active
	Medical Isotope Production	Active below SWEIS ROD level	Inactive	Inactive	Inactive	Inactive
	High-Power Microwaves and Advanced Accelerators	Active	Active	Active	Active	Active

Table 2.0-13. Capabilities (continued)

FACILITY	CAPABILITY	1998	1999	2000	2001	2002
2.12 Bioscience Facilities	Biologically Inspired Materials and Chemistry	Not in SWEIS ROD	Active	Active	Active	Active
	Computational Biology	Not in SWEIS ROD	Active	Active	Active	Active
	Environmental Biology (formerly Environmental Effects)	Active	Active	Active	Active	Active
	Genomics (formerly Genomic Studies)	Active	Active	Active	Active	Active
	Measurement Science and Diagnostics (formerly Cytometry)	Active	Active	Active	Active	Active
	Molecular and Cell Biology (formerly Cell Biology and DNA Damage and Repair)	Active	Active	Active	Active	Active
	Molecular Synthesis	Not in SWEIS ROD	Active	Active	Active	Active
	Structural Biology (formerly Structural Cell Biology)	Active	Active	Active	Active	Active
	In-Vivo Monitoring	Active	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
2.13 Radiochemistry Facility	Radionuclide Transport Studies	Active	Active	Active	Active	Active
	Environmental Remediation Support	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Ultra-Low-Level Measurements	Active	Active	Active	Active	Active
	Nuclear/Radiochemistry	Active	Active	Active	Active	Active
	Isotope Production	Active	Active	Active	Active	Active
	Actinide/TRU Chemistry	Active	Active	Active	Active	Active
	Data Analysis	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Inorganic Chemistry	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Structural Analysis	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Sample Counting	Active	Active	Active	Active	Active
2.14 RLWTF	Waste Characterization, Packaging, Labeling	Active	Active	Active	Active	Active
	Waste Transport, Receipt, and Acceptance	Active	Active	Active	Active	Active
	Radioactive Liquid Waste Pretreatment	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Radioactive Liquid Waste Treatment	Active	Active	Active	Active	Active
	Decontamination Operations	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Inactive at RLWTF; relocated to Solid Waste Facilities	Inactive at RLWTF; relocated to Solid Waste Facilities

Table 2.0-13. Capabilities (continued)

FACILITY	CAPABILITY	1998	1999	2000	2001	2002
2.15 Solid Radioactive and Chemical Waste Facilities	Waste Characterization, Packaging, Labeling	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Compaction	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Size Reduction	Inactive	Inactive	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Waste Transport, Receipt, and Acceptance	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Waste Storage	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Waste Retrieval	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Other Waste Processing	Inactive	Inactive	Inactive	Inactive	Inactive
	Disposal	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level	Active below SWEIS ROD level
	Decontamination Operations	Inactive at Solid Waste; located at RLWTF	Inactive at Solid Waste; located at RLWTF	Inactive at Solid Waste; located at RLWTF	Active at Solid Waste	Active at Solid Waste
2.16 Non-Key Facilities	Theory, Modeling, and High-performance Computing	Active	Active	Active	Active	Active
	Experimental Science and Engineering	Active	Active	Active	Active	Active
	Advanced and Nuclear Materials Research and Development and Applications	Active	Active	Active	Active	Active
	Waste Management	Active	Active	Active	Active	Active
	Infrastructure and Central Services	Active	Active	Active	Active	Active
	Maintenance and Refurbishment	Active	Active	Active	Active	Active
	Management of Environmental, Ecological, and Cultural Resources	Active	Active	Active	Active	Active

Table 2.0-14. Summary of Inactive Capabilities

FACILITY	1998	1999	2000	2001	2002
2.1 Plutonium Complex	Manufacturing Plutonium Components			Manufacturing Plutonium Components	Manufacturing Plutonium Components
			Fabrication of Ceramic-Based Reactor Fuels	Fabrication of Ceramic-Based Reactor Fuels	
2.2 Tritium Facilities				Cryogenic Separation: TSTA [a]	Cryogenic Separation: TSTA [a]
			Diffusion and Membrane Purification: TSTA, TSFF, WETF	Diffusion and Membrane Purification: TSTA, TSFF, WETF	Diffusion and Membrane Purification: TSTA, TSFF, WETF
2.3 CMR Building	Uranium Processing				
			Destructive and Nondestructive Assay	Destructive and Nondestructive Assay	Destructive and Nondestructive Assay
	Nonproliferation Training				
		Fabrication and Metallography	Fabrication and Metallography	Fabrication and Metallography	Fabrication and Metallography
2.11 LANSCE	Accelerator Transmutation of Wastes	Accelerator Transmutation of Wastes	Accelerator Transmutation of Wastes	Accelerator Transmutation of Wastes	Accelerator Transmutation of Wastes
		Medical Isotope Production	Medical Isotope Production	Medical Isotope Production	Medical Isotope Production
2.12 Bioscience Facilities	Biologically Inspired Materials and Chemistry (not in ROD) [b]				
	Computational Biology (not in ROD) [b]				
	Molecular Synthesis (not in ROD) [b]				
2.15 Solid Radioactive and Chemical Waste Facilities	Size Reduction	Size Reduction			
	Other Waste Processing	Other Waste Processing	Other Waste Processing	Other Waste Processing	Other Waste Processing

[a] Capability lost at TSTA in CY 2001 and not available elsewhere at LANL.

[b] Capability not identified for Health Research Laboratory (now Bioscience Facilities) in the SWEIS ROD. Capability developed in CY 1999.

Table 2.0-15. Summary of Wastes Generated

	SWEIS ROD	1998	1999	2000	2001	2002
Radioactive airborne emissions from point sources						
• in Ci	21,700	8,690	1,900	3,100	15,400	6,150
• Percent of 10-year average of 21,700 Ci	---	<50	<10	15	70	30
• final dose in mrem	5.44	1.72	0.32	0.65	1.84	1.69
Percent of 5.44 mrem	---	32	<6	<12	<34	<23
NPDES discharges in million gallons per year (MGY)	278	212	317	265	124	178
Percent of 278 MGY	---	<77	~114	~95	<45	~64
Chemical Waste in 10^3 kg/yr	3,250	1,771	15,441	27,674	27,583	602
Percent of $3,250 \times 10^3$ kg/yr	---	54.5	475	852	849	18.5
LLW in m^3/yr	12,200	1,837	1,678	4,229	2,597	7,310
Percent of 12,200 m^3/yr	---	15.1	13.8	34.7	21.3	59.9
MLLW in m^3/yr	632	71	21	598	58	21
Percent of 632 m^3/yr	---	11.2	3.3	94.6	9.2	3.3
TRU in m^3/yr	333	108	143	125	117	119
Percent of 333 m^3/yr	---	32.4	42.9	37.5	35.1	35.7
Mixed TRU in m^3/yr	115	34	87	87	48	87
Percent of 115 m^3/yr	---	29.6	75.7	75.7	41.7	75.7

Table 2.0-16. Flow from Permitted Outfalls [a]

FACILITY	OUTFALL	MGY SWEIS ROD	1998	1999	2000	2001	2002
2.1 Plutonium Complex	03A-181	14	8.5	8.54	6.4	0.4	2.8
2.2 Tritium Facilities	05S	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	02A-129	0.1	13.0	8.83	7.9	0.3902	10.8400
	03A-036	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	03A-158	0.2	0.7	0.14	0.7	0.00300	2.5600
	04A-091	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
2.3 CMR Building	03A-021	0.53	3.2	4.45	2.28	0.02090	0.76
2.4 Pajarito Site	None						
2.5 Sigma Complex	03A-022	4.4	12.7	5.77	3.9	0.05	2.0040
	03A-024	2.9	No discharge	No discharge	0	0	0
2.6 MSL	None						
2.7 TFF	04A-127	0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
2.8 Machine Shops	None						
2.9 High Explosives Processing	02A-007	7.4	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	03A-130	0.04	0.1	0.022	0.001	0.002	0.0020
	04A-070	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	04A-083	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	04A-092	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	04A-115	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	04A-157	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	05A-053	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	05A-054	3.6	6.3	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	05A-055	0.13	8.9	0.096	0.085	0.034	0.0275
	05A-056	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	05A-066	0.74	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	05A-067	0.33	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	05A-068	0.06	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	05A-069	0.01	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	05A-071	0.04	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	05A-072	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	05A-096	0.01	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	05A-097	0.01	1.8	No discharge	No discharge	No discharge	0.00
	06A-073	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998

Table 2.0-16. Flow from Permitted Outfalls [a] (continued)

FACILITY	OUTFALL	MGY SWEIS ROD	1998	1999	2000	2001	2002
	06A-074	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	06A-075	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
2.10 High Explosives Testing	03A-028	2.2	0.5	2.81	5	4	0.5027
	03A-185	0.73	1.2	11.42	11	5	0.8773
	04A-101	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	04A-139	None	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	04A-141	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	04A-143	0.018	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	04A-156	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	06A-079	0.54	0.1	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	06A-080	0.03	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	06A-081	0.03	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	06A-082	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	06A-099	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	06A-100	0.04	0.1	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	06A-106 [b]	0.58	No discharge	Eliminated 1999	Eliminated 1999	Eliminated 1999	Eliminated 1999
	06A-123	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
2.11 LANSCE	03A-047	7.1	13.5	3.4	3.5	0	0
	03A-048	23.4	19.1	19.7	15.6	13.05	23.25
	03A-049	11.3	20.1	10.8	9.6	5.9	0.14
	03A-113	39.8	0.7	3.3	1.8	1.5	0.65
	03A-125	0.18	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	03A-145	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	03A-146	Not listed in SWEIS	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
2.12 Bioscience Facilities	03A-040	2.5	No discharge	Eliminated 1999	Eliminated 1999	Eliminated 1999	Eliminated 1999
2.13 Radio-chemistry Facility	03A-045	0.87	No discharge	Eliminated 1999	Eliminated 1999	Eliminated 1999	Eliminated 1999
	04A-016	None	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	04A-131	None	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	04A-152	None	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	04A-153	3.2	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
2.14 RLWTF	051	9.3	6.1	5.3	4.9	3.6	2.9
2.15 Solid Radio-active and Chemical Waste Facilities	None						

Table 2.0-16. Flow from Permitted Outfalls [a] (continued)

FACILITY	OUTFALL	MGY SWEIS ROD	1998	1999	2000	2001	2002
2.16 Non-Key Facilities	001	114	Active	Active	170	98.75	101.3200
	013	No direct discharge; goes through 001	No direct discharge; goes through 001	No direct discharge; goes through 001	No direct discharge; goes through 001	No direct discharge; goes through 001	No direct discharge; goes through 001
	03A-027	5.8	Active	Active	8.7	0.13	6.6070
	03A-160	5.1	Active	Active	14	0.13	22.9000
	03A-199	Added to permit on 2/1/01	Not on permit	Not on permit	Not on permit	No discharge	No discharge
	03A-042	5.30	No discharge	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	04A-118	1.10	No discharge	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999
	04A-166	0.01	No discharge	No observation	Eliminated 1999	Eliminated 1999	Eliminated 1999
	03A-038	5.80	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	04A-171	0.00	No discharge	No discharge	Eliminated 1999	Eliminated 1999	Eliminated 1999
	04A-172	0.00	No discharge	No discharge	Eliminated 1999	Eliminated 1999	Eliminated 1999
	04A-173	0.00	No discharge	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999
	04A-174	0.00	No discharge	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	04A-175	0.00	No discharge	No observation	Eliminated 1999	Eliminated 1999	Eliminated 1999
	04A-176	0.66	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999
	04A-177	0.06	No discharge	No observation	Eliminated 1999	Eliminated 1999	Eliminated 1999
	03A-034	0.26	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	03A-035	0.04	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	04A-182	0.00	Active	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	04A-186	0.18	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999
	06A-132	5.80	No discharge	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	03A-025	0.18	Active	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
	04A-164	0.01	No discharge	No observation	Eliminated 1999	Eliminated 1999	Eliminated 1999
	04A-161	1.00	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999
	03A-148	6.30	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	04A-094	5.30	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
	04A-163	6.20	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999
	04A-165	2.00	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999
Total Outfalls:							
• **With flow**			18	13	18	18	19
• **Active**			10	10	0	0	0
• **Active and eliminated from permit**			0	7	0	0	0

Table 2.0-16. Flow from Permitted Outfalls [a] (continued)

		MGY					
FACILITY	**OUTFALL**	**SWEIS ROD**	**1998**	**1999**	**2000**	**2001**	**2002**
• **No discharge, but on permit**			12	4	1	2	1
• **No discharge and eliminated from permit**			0	2	0	0	0
• **No direct discharge**			1	1	1	1	1
• **With flow, but later eliminated from permit**			2	7	0	0	0
• **Eliminated from permit during year**			22 during 1997 30 during 1998	16 during 1999	0 during 2000	0 during 2001	0 during 2002
• **No observation**			0	4	0	0	0
• **Added to permit during year**			0 during 1997 0 during 1998	0 during 1999	0 during 2000	1 during 2001	0 during 2002
Total Outfalls at end of year			66 at end of 1998	36 at end of 1999	20 at end of 2000	21 at end of 2001	21 at end of 2002

[a] Eliminated means that the outfall was eliminated from the NPDES permit during the specified year. No discharge means that there was no flow from the outfall. A “0.0” means that there was a very small flow from the outfall. Active means that the outfall was listed on the NPDES permit and did discharge at least once during the year. Active and eliminated from permit means that the outfall was listed on the NPDES permit at the beginning of the year, discharged at least once during the year, and was eliminated from the NPDES permit by the end of the year. No observation means that this outfall was part of a supply well and was not checked during the year because the well was being transferred to Los Alamos County.

[b] This outfall was listed in the SWEIS under the Non-Key Facilities.

This chapter also discusses Non-Key Facilities, which include all buildings and structures not part of a Key Facility, or the balance of LANL. Although operations at Non-Key Facilities do not contribute significantly to radiation doses or generation of radioactive wastes, the Non-Key Facilities represent a significant fraction of LANL. The Non-Key Facilities comprise all or the majority of 30 of LANL's 49 technical areas, and approximately 14,224 of LANL's estimated 26,480 acres. The Non-Key Facilities also employ about half the LANL workforce. The Non-Key Facilities include such important buildings and operations as the Central Computing Facility, the TA-46 sewage treatment facility, and the Main Administration Building. Table 2.0-17 identifies and compares the acreage of the 15 Key Facilities and the Non-Key Facilities. Figure 2-1 shows the location of LANL within northern New Mexico, while Figure 2-2 illustrates the technical areas. Figure 2-3 shows the locations of the Key Facilities.

With the issuance of Nuclear Safety Management (10 CFR 830) on January 10, 2001, on-site transportation also needs to be addressed relative to nuclear hazard categorization (FR 2001). This is a change from the SWEIS. At the time the SWEIS was published, on-site transportation was considered part of the affected environment in Section 4.10.3.1. The on-site transportation of nuclear materials greater than or equal to Hazard Category 3 quantities is addressed in a DOE approved safety analysis (LANL 2002c, DOE 2002a, Steele 2002). The implementation of the analysis and associated controls is under development.

Table 2.0-17. Acreage for Key and Non-Key Facilities

FACILITY	TECHNICAL AREAS	~SIZE (ACRES)
Plutonium Complex	TA-55	93
Tritium Facilities	TA-16 & TA-21	312
CMR Building	TA-03	14
Pajarito Site	TA-18	131
Sigma Complex	TA-03	11
MSL	TA-03	2
TFF	TA-35	3
Machine Shops	TA-03	8
High Explosives Processing	TAs 08, 09, 11, 16, 22, 28, 37	1,115
High Explosives Testing	TAs 15, 36, 39, 40	8,691
LANSCE	TA-53	751
Bioscience Facilities (Formerly Health Research Laboratory)	TA-43, 03, 16, 35, 46	4
Radiochemistry Facility	TA-48	116
RLWTF	TA-50	62
Solid Radioactive and Chemical Waste Facilities	TA-50 & TA-54	943
Subtotal, Key Facilities		12,256
Non-Key Facilities	30 of 49 TAs	14,244
LANL		26,480

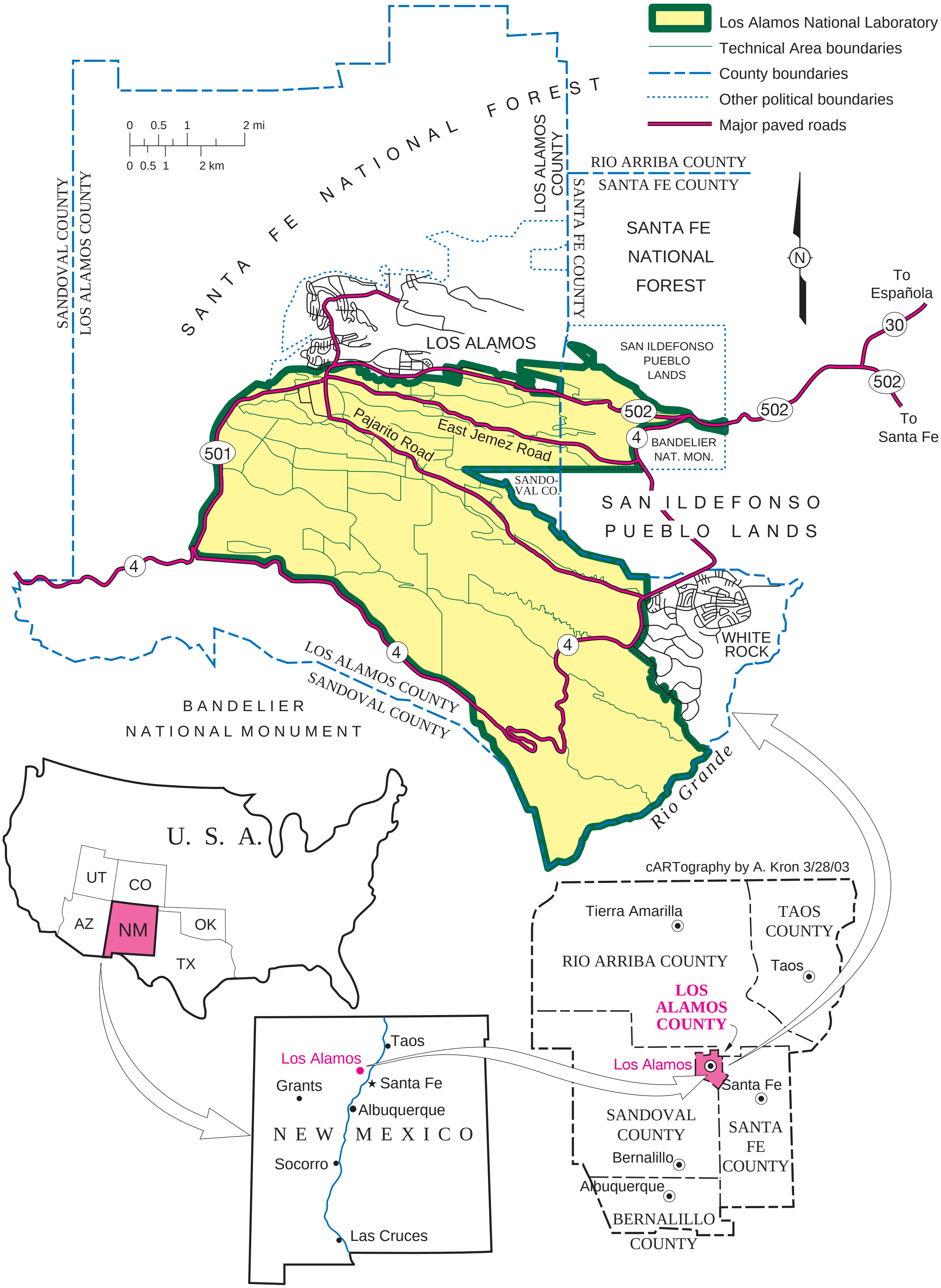


Figure 2-1. Location of LANL.

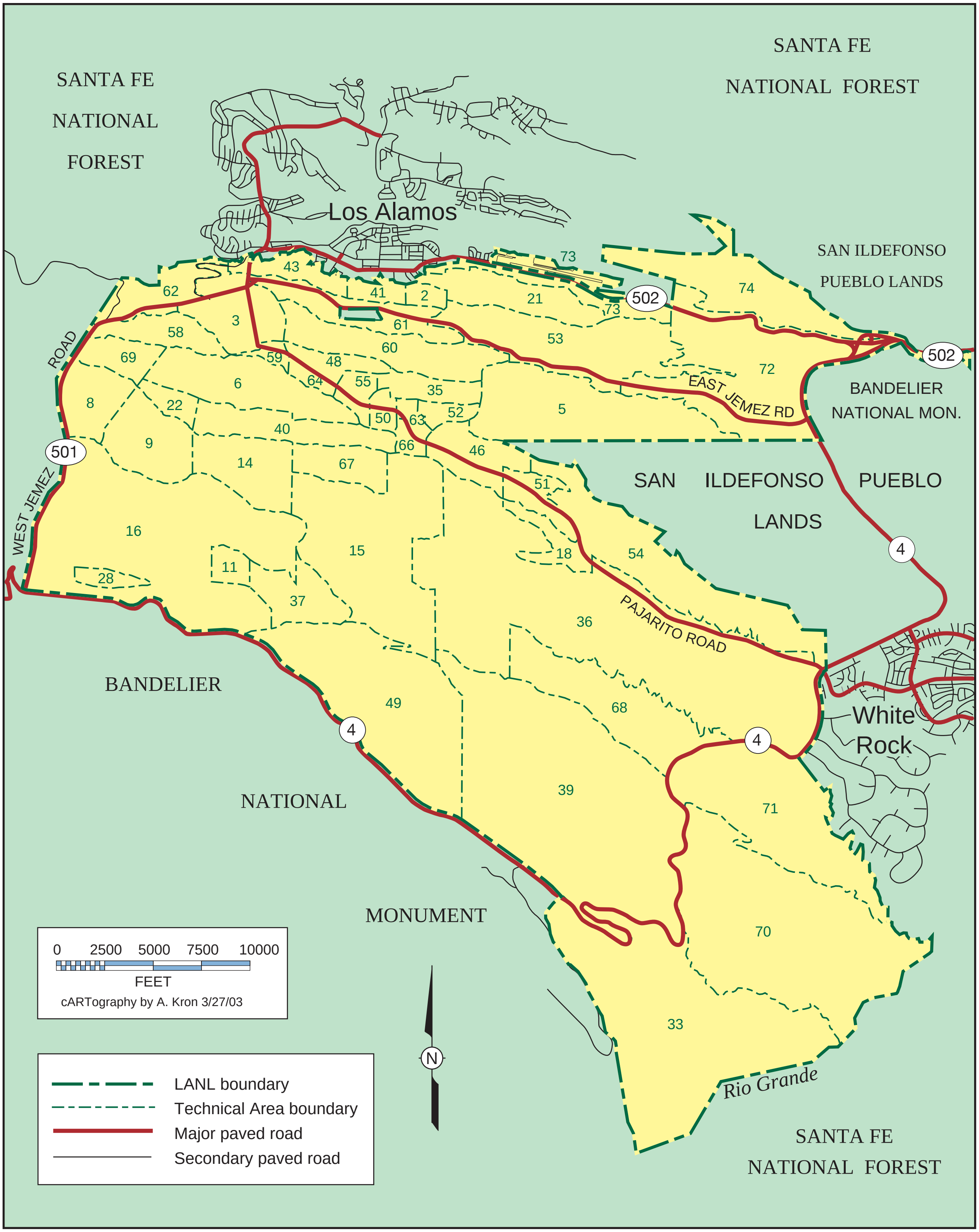


Figure 2-2. Location of technical areas.

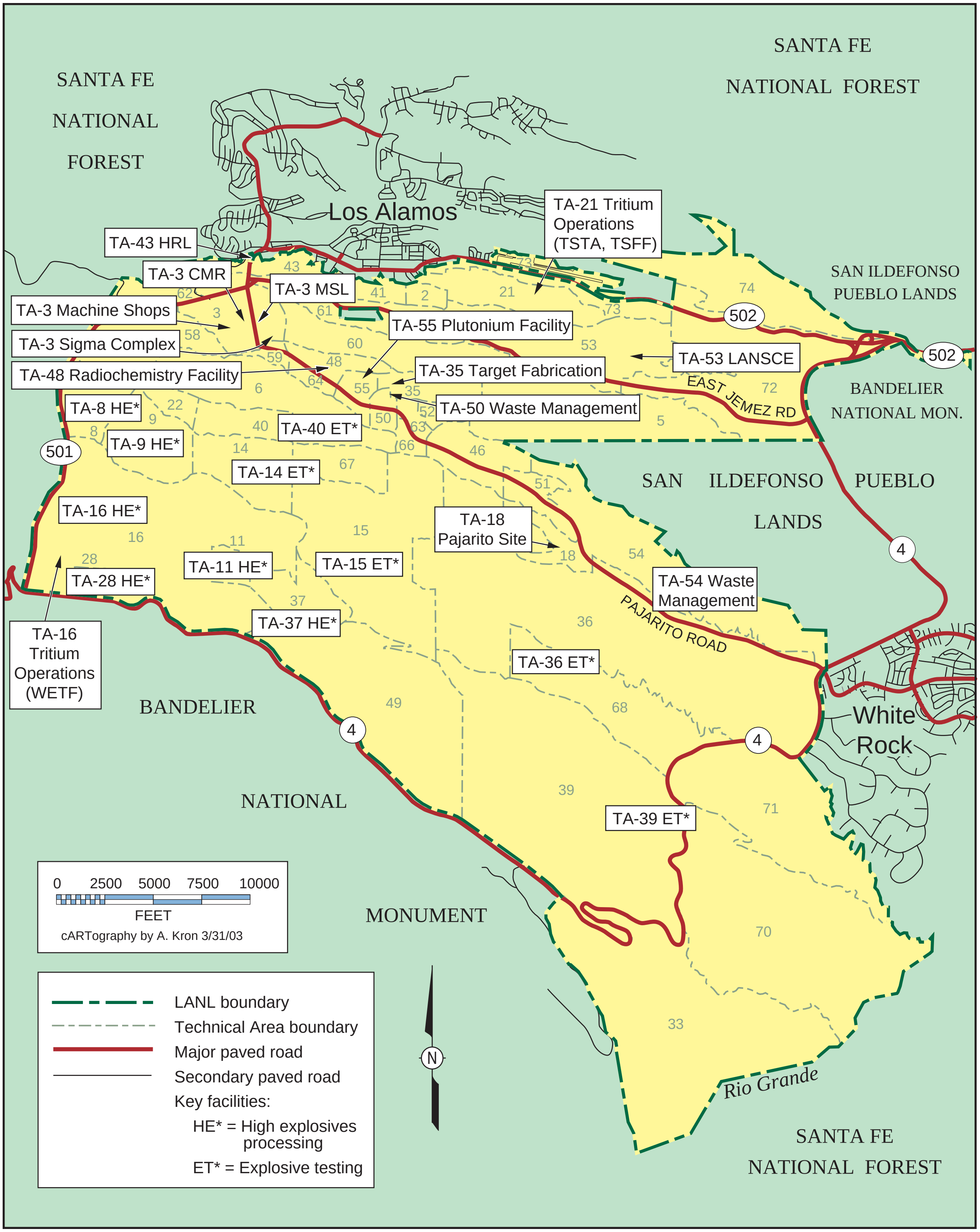


Figure 2-3. Location of Key Facilities.

2.1 Plutonium Complex (TA-55)

The Plutonium Complex Key Facility consists of six primary buildings and a number of lesser buildings and structures. As presented in the SWEIS, this Key Facility contained one operational Category 2 nuclear hazard facility (TA-55-4), two Low Hazard chemical facilities (TA-55-3 and TA-55-5), and one Low Hazard energy source facility (TA-55-7).

The DOE listing of LANL nuclear facilities for both 1998 and 2002 (DOE 1998a, LANL 2002a) retained Building TA-55-4 as a Category 2 nuclear hazard facility as shown in Table 2.1-1.

Table 2.1-1. Plutonium Complex Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]
TA-55-0004	PU-238 Processing	2	2	2	2	2	2
TA-55-0041	Nuclear Material Storage	2					

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
[c] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
[d] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
[e] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

The SWEIS also identified one potential Category 2 nuclear hazard facility (TA-55-41, the Nuclear Material Storage Facility [NMSF]), which was slated for potential modification to bring it into operational status. This was not done, and the DOE removed this facility from its list of nuclear facilities in its April 2000 listing (DOE 2000a). There are currently no plans to use this building for storage of nuclear materials.

2.1.1 Construction and Modifications at the Plutonium Complex

Projected: The SWEIS projected four facility modifications:

- renovation of the NMSF;
- construction of a new administrative office building;
- upgrades within Building 55-4 to support continued manufacturing at the existing capacity of 14 pits per year; and
- further upgrades for long-term viability of the facility and to boost production to a nominal capacity of 20 pits per year.

Aerial view of the Plutonium Complex (TA-55)

Actual: During the period 1996–2002, the new administrative office building was completed and upgrades to maintain existing capacity were undertaken.
In 1999, design efforts for renovation of the NMSF were halted and there are no current plans to continue the renovations. The upgrades included the 1996 installation of a new TA-55 Facility Control System with computers and controls located in the Operations Center and the continuing replacement of the main fire protection water line and pump houses. Explorations for placing parts of CMR and TA-18 at TA-55 began in 2001 and are continuing. Table 2.1.1-1 shows a more detailed comparison of the projected and actual construction and modifications at the Plutonium Complex.

Table 2.1.1-1. Plutonium Complex Construction and Modifications

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Renovation of the NMSF		Design efforts for renovation of NMSF were halted.			
Construction of a new administrative office building	Design commenced on a new office building.	A new office building, the FITS building was constructed (LANL 1998a).			FITS Parking Lot (not physically started in 2002; LANL 2002d).
				Nuclear Materials Technology FY 2001 Office Building, Manufacturing Technical Support Facility (LANL 2001d, DOE 1996a).	Construction began in 2002
Upgrades within Building 55-4 to support continued manufacturing at the existing capacity of 14 pits per year	Upgrades to maintain existing capacity were continued—1996 installation of a new TA-55 Facility Control System.	Upgrades to maintain existing capacity were continued.	Upgrades to maintain existing capacity were continued.	Upgrades to maintain existing capacity were continued.	
				Nuclear Materials Technology Protect Combustible Materials (LANL 2001e, DOE 1996b).	Continuing in 2002.
			Design of main fire protection water line and pump houses replacement.	TA-55 Fire Protect Yard Main Replacement (LANL 2001f, DOE 1996c).	Completed in 2002 except for repaving scheduled for summer 2003.
				FRIT Transfer System (LANL 2001g, DOE 1996d).	On-going in 2002.
				Nuclear Materials Technology Fire Safe Storage Building (LANL 2001h, DOE 1996e).	Construction not started.
					TA-55 Radiography/ Interim (LANL 2001i).

Table 2.1.1-1. Plutonium Complex Construction and Modifications (continued)

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
					TA-55 Radiography (complements interim; LANL 2001j, LANL 2002e).
					Temporary Parking (False perimeter intrusion detection and assessment system; not completed in 2002; LANL 2002f).
Further upgrades for long-term viability of the facility and to boost production to a nominal capacity of 20 pits per year				CMR Replacement Project Preconceptual Design (LANL 2001k).	Ongoing in 2002 draft environmental impact statement review in 2003.
				TA-18 Relocation Project Office Building (LANL 2001l, DOE 2001a).	Temporary building between TA-55 and TA-48 on north side of Pajarito Road.
				TA-18 Relocation Project CAT III/IV at TA-55 (LANL 2001m, DOE 2001a).	Under consideration at end of 2002.
				TA-18 Relocation Project CAT-I Piece (LANL 2001n, DOE 2001a).	No longer planned for TA-55 at end of 2002.
					CMR Replacement Geotechnical Investigation (LANL 2002g).

2.1.2 Operations at the Plutonium Complex

The SWEIS identified seven capabilities[4] for this Key Facility. No new capabilities have been added; however, one capability, Special Nuclear Materials (SNM) Storage, Shipping, and Receiving, had planned on using the NMSF. Because of changes in plans, the NMSF will not be used for this activity, and SNM storage, shipping, and receiving will continue to be performed at the Plutonium Facility (Building 55-4). For all seven capabilities, activity levels were below those projected by the SWEIS ROD. Table 2.1.2-1 presents details.

2.1.3 Operations Data for the Plutonium Complex

Details of operational data are presented in Table 2.1.3-1. From 1998 through 2002, radioactive air emissions were much less than the SWEIS ROD projections (less than 61 curies in 2002 and less than 5 curies in 2001 compared to 1,000 curies projected). The only wastes to exceed the SWEIS ROD projections have been the chemical wastes in 1998, 2001, and 2002 due to unique events. During 1998, a LANL-wide campaign to identify and dispose of chemicals no longer needed or used resulted in 10,861 kilograms of chemical waste at TA-55 rather than the 8,400 kilograms projected. This campaign was called the Legacy Waste Cleanup Project. It was completed in September 1998 and required facilities to locate and inventory all materials. More than 22,000 items Lab-wide were characterized, collected, and managed. Many items were sent to commercial facilities for treatment and disposal. In 2000, cleanup from the Cerro Grande Fire generated 763 kilograms of construction and demolition debris (previously identified in the Yearbooks as industrial waste) sent to local landfills for disposal. In 2001, the 11,709 kilograms of chemical waste included 10,433 kilograms of solid waste material from the replacement of the hydraulic cylinders at the front gate. This waste consisted of dirt, rocks, concrete chips, and asphalt chips. During 2002, a large transformer adjacent to the Facilities Improvement Technical Support (FITS) building needed to be relocated for the construction of the Manufacturing Technical Support Facility. While the transformer was being moved, it was dropped and non-polychlorinated biphenyl oil spilled from the transformer creating chemical waste (New Mexico Special Waste) that had to be cleaned up.

Radiological Control Technician counts waste container

[4] As defined in the SWEIS, a capability refers to the combination of buildings, equipment, infrastructure, and expertise necessary to undertake types or groups of activities and to implement mission assignments. Capabilities at LANL have been established over time, principally through mission assignments and activities directed by DOE Program Offices.

Table 2.1.2-1. Plutonium Complex/Comparison of Operations

CAPABILITIES	SWEIS ROD[a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Plutonium Stabilization	Recover, process, and store the existing plutonium inventory in eight years.	On schedule with focus on highest priority inventory items.	Highest priority items have been stabilized. The implementation plan is being modified between DOE and the Defense Nuclear Facilities Safety Board with a longer completion schedule.	Highest priority items have been stabilized. The implementation plan is being modified between DOE and the Defense Nuclear Facilities Safety Board with a longer completion schedule.	Highest priority items have been stabilized. The implementation plan is being modified between DOE and the Defense Nuclear Facilities Safety Board to be completed by 2010.	Highest priority items have been stabilized. The implementation plan has been modified between DOE and the Defense Nuclear Facilities Safety Board to be completed by 2010.
Manufacturing Plutonium Components	Produce nominally 20 war reserve pits per year. (Requires minor facility modifications.)	There were no war reserve pits produced or accepted by DOE for transfer to the nuclear stockpile.	There were no war reserve pits produced or accepted by DOE for transfer to the nuclear stockpile. Four development pits were fabricated in preparation for eventual war reserve fabrication.	There were no war reserve pits produced or accepted by DOE for transfer to the nuclear stockpile. Two development pits were fabricated in preparation for eventual war reserve fabrication.	There were no war reserve pits produced or accepted by DOE for transfer to the nuclear stockpile.	There were no war reserve pits produced or accepted by DOE for transfer to the nuclear stockpile.
Surveillance and Disassembly of Weapons Components	Pit disassembly: Up to 65 pits per year disassembled. Pit surveillance: Up to 40 pits per year destructively examined and 20 pits per year non-destructively examined.	Consistent with the No Action Alternative, no more than 20 pits were disassembled and no more than 20 pits were examined during 1998.	Less than 65 pits were disassembled during 1999. Less than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in 1999.	Less than 65 pits were disassembled during 2000. Less than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in 2000.	Less than 65 pits were disassembled during 2001. Less than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in 2001.	Less than 65 pits were disassembled during 2002. Less than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in 2002.
Actinide Materials and Science Processing, Research, and Development	Develop production disassembly capacity. Process up to 200 pits per year, including a total of 250 pits (over four years) as part of disposition demonstration activities.	Fewer than 200 pits were disassembled or converted in 1998.	Fewer than 200 pits were disassembled or converted in 1999.	Fewer than 200 pits were disassembled or converted in 2000.	Fewer than 200 pits were disassembled or converted in 2001.	Fewer than 200 pits were disassembled or converted in 2002.

Table 2.1.2-1. Plutonium Complex/Comparison of Operations (continued)

CAPABILITIES	SWEIS ROD[a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Actinide Materials and Science Processing, Research, and Development (cont.)	Process neutron sources up to 5,000 Ci/yr. Process neutron sources other than sealed sources.	Processed sources containing ~120 Ci in 1998.	Neutron sources are not currently being disassembled and chemically processed.	Neutron sources are not currently being disassembled and chemically processed.	Neutron sources are not currently being disassembled and chemically processed.	Neutron sources are not currently being disassembled and chemically processed. Off-site sources are being recovered from government, industrial, and academic activities, repackaged, and sent to TA-54 for final disposition. No new sources are being processed.
	Process up to 400 kg/yr of actinides.[b] Provide support for dynamic experiments.	Processed ~140 kg of actinide material in 1998. Supported dynamic experiments. Processed 10 pits through tritium separation at TA-55.	Less than 400 kg/yr of actinides were processed. Support was provided for dynamic experiments.	Less than 400 kg/yr of actinides were processed. Support was provided for dynamic experiments. Less than 12 pits per year were processed through tritium separation in 2000.	Less than 400 kg/yr of actinides were processed. Support was provided for dynamic experiments.	Less than 400 kg/yr of actinides were processed. Support was provided for dynamic experiments.
	Perform decontamination of 28 to 48 uranium components per month.	Decontaminated/ converted 24 uranium components in 1998.	In 1999, less than 48 uranium components were decontaminated.	In 2000, less than 48 uranium components were decontaminated.	In 2001, less than 48 uranium components were decontaminated.	In 2002, less than 48 uranium components were decontaminated per month.

Table 2.1.2-1. Plutonium Complex/Comparison of Operations (continued)

CAPABILITIES	SWEIS ROD[a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Actinide Materials and Science Processing, Research, and Development (cont.)	Research in support of DOE actinide cleanup activities. Stabilize minor quantities of specialty items. Research and development on actinide processing and waste activities at DOE sites, including processing up to 140 kg of plutonium as chloride salts from the Rocky Flats Environmental Technology Site.	Research supporting DOE actinide cleanup activities continued at low level. Small quantities of plutonium residues from Rocky Flats were processed.	Research supporting DOE actinide cleanup activities continued at low levels. No plutonium residues from Rocky Flats were processed.	Research supporting DOE actinide cleanup activities continued at low levels. No plutonium residues from Rocky Flats were processed.	Research supporting DOE actinide cleanup activities continued at low levels. No plutonium residues from Rocky Flats were processed.	Research supporting DOE actinide cleanup activities continued at low levels. No plutonium residues from Rocky Flats were processed.
	Conduct plutonium research and development and support. Prepare, measure, and characterize samples for fundamental research and development in areas such as aging, welding and bonding, coatings, and fire resistance.	Sample preparation and characterization continued.	Sample preparation and characterization continued.	Sample preparation and characterization continued.	Sample preparation and characterization continued.	Sample preparation and characterization continued.
	Fabricate and study nuclear fuels used in terrestrial and space reactors. Fabricate and study prototype fuel for lead test assemblies.	Minimal terrestrial and space reactor fuel development occurred in 1998.	Minimal terrestrial and space reactor fuel development occurred in 1999.	Minimal terrestrial and space reactor fuel development occurred in 2000.	Minimal terrestrial and space reactor fuel development occurred in 2001.	The DOE/Office of Nuclear Energy Advanced Fuel Cycle Initiative (AFCI) is fabricating actinide nitride fuels for irradiation in a reactor environment. Lead test assemblies are being considered for the future.

Table 2.1.2-1. Plutonium Complex/Comparison of Operations (continued)

CAPABILITIES	SWEIS ROD[a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Actinide Materials and Science Processing, Research, and Development (cont.)	Develop safeguards instrumentation for plutonium assay.	Continued support of safeguards instrumentation development.	Continued support of safeguards instrumentation development.	Continued support of safeguards instrumentation development.	Continued support of safeguards instrumentation development.	Continued support of safeguards instrumentation development.
	Analyze samples in support of actinide reprocessing and research and development activities.	Analysis of actinide samples at TA-55 continued in support of actinide reprocessing and research and development activities.	Analysis of actinide samples at TA-55 continued in support of actinide reprocessing and research and development activities.	Analysis of actinide samples at TA-55 continued in support of actinide reprocessing and research and development activities.	Analysis of actinide samples at TA-55 continued in support of actinide reprocessing and research and development activities.	Analysis of actinide samples at TA-55 continued in support of actinide reprocessing and research and development activities.
Fabrication of Ceramic-Based Reactor Fuels	Build mixed oxide test reactor fuel assemblies and continue research and development on fuels.	Manufactured ~11 kg of mixed oxide fuel in 1998.	Manufactured ~10 kg of mixed oxide fuel in 1999.	No mixed oxide fuel was manufactured in 2000.	No mixed oxide fuel was manufactured in 2001.	AFCI mixed oxide fuels are being fabricated for irradiation testing.
Plutonium-238 Research, Development, and Applications	Process, evaluate, and test up to 25 kg/yr plutonium-238. Recycle residues and blend up to 18 kg/yr plutonium-238.	Recovered ~0.5 kg and processed ~1.5 kg of plutonium-238 in 1998.	Recovered ~0.5 kg of plutonium-238 and processed ~1.0 kg of plutonium-238 for heat source fuel in 1999.	Recovered ~0.65 kg of plutonium-238 and processed ~0.75 kg of plutonium-238 for heat source fuel in 2000.	Recovered ~1.1 kg of plutonium-238 and processed ~0.70 kg of plutonium-238 for heat source fuel in 2001.	Recovered ~1.5 kg of plutonium-238 and processed ~2.2 kg of plutonium-238 for heat source fuel.
Nuclear Materials Storage, Shipping, and Receiving	Store up to 6,600 kg SNM in the NMSF; continue to store working inventory in the vault in Building 55-4; ship and receive SNM as needed to support LANL activities.	NMSF not operational as a storage vault. Building 55-4 vault levels remained approximately constant with 1996 levels.	NMSF is not operational as a storage vault and there are no current plans to complete the modifications required to use the facility as a storage vault. Building 55-4 vault levels remained approximately constant with 1996 levels.	Because of changes in plans, the NMSF will not be used for this activity, and SNM storage, shipping, and receiving will continue to be performed at the Plutonium Facility (Building 55-4). Building 55-4 vault levels remained constant at levels identified during preparation of the SWEIS.	Because of changes in plans, the NMSF will not be used for this activity, and SNM storage, shipping, and receiving will continue to be performed at the Plutonium Facility (Building 55-4). Building 55-4 vault levels remained approximately constant at levels identified during preparation of the SWEIS.	Because of changes in plans, the NMSF will not be used for this activity, and SNM storage, shipping, and receiving will continue to be performed at the Plutonium Facility (Building 55-4). Building 55-4 vault levels remained approximately constant at levels identified during preparation of the SWEIS.

Table 2.1.2-1. Plutonium Complex/Comparison of Operations (continued)

CAPABILITIES	SWEIS ROD[a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
	Conduct non-destructive assay on SNM at the NMSF to identify and verify the content of stored containers.	NMSF not operational as a storage vault and was not used for nondestructive assay.	NMSF not operational as a storage vault and was not used for non-destructive assay.	The NMSF is not operational as a storage vault and was not used for non- destructive assay.	The NMSF is not operational as a storage vault and was not used for non-destructive assay.	The NMSF is not operational as a storage vault and was not used for non-destructive assay.

[a] Includes renovation of the NMSF (which is no longer planned for use), construction of new technical support office building, and upgrades to enable the production of nominally 20 war reserve pits per year.

[b] The actinide activities at the CMR Building and at TA-55 are expected to total 400 kilograms per year. The future split between these two facilities was not known, so the facility-specific impacts at each facility were conservatively analyzed at this maximum amount. Waste projections that are not specific to the facility (but are related directly to the activities themselves) are only projected for the total of 400 kilograms per year.

Table 2.1.3-1. Plutonium Complex/Operations Data

PARAMETER	UNITS [a]	SWEIS ROD	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Radioactive Air Emissions:							
Plutonium-239 [b]	Ci/yr	2.70E-05	6.20E-08	1.2E-07	2.4E-06	3.2E-08	8.1E-08
Plutonium-238	Ci/yr	Not projected [c]	Not detected	Not detected	1.1E-07	1.0E-08	1.4E-08
Americium-241	Ci/yr	Not projected [c]	Not detected	5.4E-08	3.3E-07	6.2E-09	1.6E-08
Other actinides [d]	Ci/yr	Not projected [c]	Not detected	Not detected	Not detected	3.2E-07	1.2E-07
Tritium in Water Vapor	Ci/yr	7.50E+2	4.80E-01	3.1E-01	3.1E-01	7.4E-01	1.6E+0
Tritium as a Gas	Ci/yr	2.50E+2	1.40E+0	1.45E+0	6.1E+0	2.5E+0	5.9E+01
Uranium-234	Ci/yr	Not projected [c]	Not detected	2.0E-08	Not detected	Not detected	6.8E-08
Uranium-238	Ci/yr	Not projected [c]	Not detected	5.1E-08	Not detected	Not detected	1.6E-07
NPDES Discharge [e]							
Number of outfalls	---	1	1	1	1	1	1
Total Discharge	MGY	14	8.5	8.54	6.4	0.4	2.8
03A–181 [f]	MGY	14	8.5	8.54	6.4	0.4	2.8
Wastes:							
Chemical	kg/yr	8,400	10,861	2,538	1,563	11,709	14,243
LLW [g]	m^3/yr	754 [h]	238	345	199	300	296.3
MLLW	m^3/yr	13 [h]	1.3	3.9	1.75	12.6	3.34
TRU	m^3/yr	237 [i]	73.3	94.3	54.1	35.6	40.6
Mixed TRU	m^3/yr	102 [i]	16.8	66	16.8	29.6	54.9
Number of Workers	FTEs	1,111 [j] 589 [j]	526 [j]	589 [j]	572 [j]	635 [j]	689 [j]

a Ci/yr = curies per year; MGY = million gallons per year; FTEs = full-time equivalent workers.
b Projections for the SWEIS were reported as plutonium or plutonium-239, the primary material at TA-55.
c The radionuclide was not projected in the SWEIS ROD because it was either dosimetrically insignificant or not isotopically identified.
d These radionuclides include isotopes of thorium.
e NPDES is National Pollutant Discharge Elimination System.
f This outfall flowed all four quarters during CY 1999, 2000, and 2001.
g LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; TRU = transuranic.
h Includes estimates of waste generated by the facility upgrades associated with pit fabrication.
i The SWEIS provided data for TRU and mixed TRU wastes in Chapter 3 and Chapter 5. However, projections made had to be modified to reflect the decision to produce nominally 20 pits per year.
j The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for CY 1998 through CY 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 1998 through 2002 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part- time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Glovebox lines

Waste transfer

2.1.4 Cerro Grande Fire Effects at the Plutonium Complex

On Monday, May 8, 2000, LANL officially closed because of the Cerro Grande Fire. At 1328 hours on May 10, because of worsening fire conditions, Building TA-55-4 was put into off-normal operations status (e.g., normal operations were terminated, some of the facility systems were shut down, and program operations that relied upon those systems required alternative services). In addition, zones 2 and 3 ventilation systems were shut down to reduce intake ventilation airflow. Ventilation systems in all other support buildings at TA-55 were also shutdown in an effort to mitigate facility damage from heavy smoke and blowing embers. At 2130 hours, because of fire encroaching on the fenced perimeter intrusion detection and assessment systems area surrounding TA-55, Building TA-55-4 was completely shut down and entombed (e.g., all massive vault-type doors were shut and locked). Shortly thereafter at 0010 hours on May 11, Operations Center personnel were ordered to evacuate. Protection Technology Los Alamos (PTLA) continued to perform rounds to ensure that the security envelope at TA-55 remained intact. On May 12, a limited number of facility operations personnel returned to TA-55 for an initial condition assessment. Power was partially restored to recover security and fire suppression systems. Building TA-55-4 was found to be stable with no indication of contamination. The uninterruptible power supply system, Operations Center ventilation, and vault cooling system were re-energized. A Facility Recovery Plan was written, approved, and implemented in the days that followed. On May 15, the facility again resumed around-the-clock manning of the Operations Center. On May 22, all Building TA-55-4 systems were operable and Building TA-55-4 was again placed in full operations status.

Although fire encroached on the fenced perimeter intrusion detection and assessment systems area surrounding TA-55, none of the buildings suffered serious fire damage.

2.2 Tritium Facilities (TA-16 and TA-21)

This Key Facility consists of tritium operations at TA-16 and TA-21. Tritium operations are conducted primarily in three buildings: The WETF (Building TA-16-205), the TSTA (Building TA-21-155), and the TSFF (Building TA-21-209). Limited operations involving the removal of tritium from actinide material are conducted at LANL's TA-55 Plutonium Facility; however, these operations are small in scale and this operation was not included as part of the Tritium Facilities in the SWEIS. The tritium emissions from TA-55, however, are included in the TA-55 Key Facility.

The three facilities, (WETF, TSTA, and TSFF) had tritium inventories greater than 30 grams during the 1996–2002 timeframe and thus are Category 2 nuclear facilities. However, the scope of the tritium activities at TSTA and TSFF is now being reduced. Programmatic activities at TSTA have been discontinued. Only work supporting tritium inventory removal and facility deactivation is now conducted at TSTA. The tritium inventory at the end of 2002 was estimated to be less than 20 grams. During 2003, the inventory will be reduced to less than 1.6 grams and it is expected that LANL and DOE will reclassify the facility to a radiological facility (less than 1.6 grams tritium). TSTA will be placed in a stable surveillance and maintenance mode until decommissioning and demolition funding become available.

Programmatic activities at the TSFF are also being reduced and are expected to be moved to WETF and TA-16-202 in 2003. The TSFF transition to radiological facility is estimated to occur in 2006. When funding becomes available the TSFF will be deactivated.

As shown in Table 2.2-1, the Nuclear Hazard Classification of these three facilities has remained constant. Although WETF was separated into its three component buildings in the SWEIS, it is now considered a single building.

Table 2.2-1. Tritium Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]
TA-16-0205 [f]	WETF	2	2	2	2	2	2
TA-16-0205A [f]	WETF	2					
TA-16-0450 [f]	WETF	2					
TA-21-0155	TSTA	2	2	2	2	2	2
TA-21-0209	TSFF	2	2	2	2	2	2

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
[c] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
[d] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
[e] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)
[f] In 2002, TA-16-205 and TA-16-205A are nuclear facilities while TA-16-450 is not operational with tritium. When the WETF Safety Analysis Report is approved and an operational readiness review is completed, TA-16-205, -205A, and -450 will be considered one facility.

2.2.1 Construction and Modifications at the Tritium Facilities

Projected for the Tritium Facilities: The ROD projected extending the WETF tritium operations into TA-16-450.

Actual for WETF: No major upgrades were made to the WETF at TA-16 during the period 1996-1998. However, significant remodeling to the adjacent building, TA-16-450, was begun with the goal of extending the WETF tritium processing area into Building 450 (as was projected by the ROD). The remodeling of TA-16-450 continued in 1999 and was completed in 2000. No major upgrades were made to the WETF at

TA-16 during 1999, 2000, and 2001. Upgrade of a part of the WETF roof to meet current seismic requirements was begun in November 2000 and was completed in March 2001. This modification involved additional structural attachment of the existing roof to the facility walls. NEPA review for the re-roofing was provided by Categorical Exclusion (DOE 1998b). A new WETF office building (Building 824) was completed in November 2001. This work was also done under a Categorical Exclusion (DOE 1998c).

During 2002, there were no new major construction activities or building modifications at WETF at TA-16. The operational readiness review to extend the tritium processing area of WETF into Building 450 was started in 2002. At the completion of the operational readiness review, Building 450 will be integrated into WETF tritium operations. The modification of Building 450 is to accommodate neutron tube target loading operations and related research. This modification was addressed by the SWEIS ROD and has its own NEPA coverage via an environmental assessment and Finding of No Significant Impact (DOE 1995a).

Actual for TSTA and TSFF: A new cooling tower was installed to replace the original TSTA cooling tower at TA-21 (DOE 2000b). This reduced the amount of tritium released into the LANL liquid radioactive waste system. No other modifications to either TSTA or TSFF were made during the period 1996–1998. In November 1999, DOE determined that the TSTA facility has completed its mission and the tritium will be removed from TSTA in the next several years. During 2001, only a limited experimental program was carried out in TSTA, and this program was completed by June 2001. There were no facility modifications made to the TA-21 facilities from 1999 through 2002.

A summary of construction and modification activities is presented in Table 2.2.1-1.

2.2.2 Operations at the Tritium Facilities

The SWEIS identified nine capabilities for this Key Facility. No new capabilities have been added, and one, Cryogenic Separation at TSTA, has been deleted. Table 2.2.2-1 lists the nine capabilities identified in the SWEIS and presents CY 1998 through CY 2002 operational data for each of these capabilities. Operations in 1998 through 2002 were below the SWEIS ROD projections and remained within the established environmental envelope. For example, in 2002, 25 High-Pressure Gas Fill operations were conducted (compared to 65 fills projected by the SWEIS ROD), and approximately 20 gas boost system tests and gas processing operations were performed (compared to 35 projected).

Tritium water collection drums

Table 2.2.1-1. Tritium Facilities Construction and Modifications

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
WETF at TA-16					
Extend the WETF tritium operations into TA-16-450	Significant remodeling of TA-16-450 begun (DOE 1995a).	Remodeling of TA-16-450 continued.	Remodeling of TA-16-450 completed.		
			Upgrade of WETF roof began (DOE 1998b).	WETF roof upgrade completed.	
				Several existing systems upgraded.	
				WETF office building completed (DOE 1998c).	
TSTA and TSFF at TA-21					
		New cooling tower for TSTA (DOE 2000b).			
	Outfall 05S, 03A-036, and 04A-091 eliminated from NPDES permit.				
		DOE determined that TSTA mission completed.		TSTA completed limited experimental program.	
					Cross country transfer line to TA-50 removed (See Section 2.14).

Table 2.2.2-1. Tritium Facilities/Comparison of Operations

CAPABILITY	SWEIS ROD[a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
High-Pressure Gas Fills and Processing: WETF	Handling and processing of tritium gas in quantities of up to 100 g with no limit on number of operations per year. Capability used ~65 times per year.	Approximately 30 high-pressure gas fills/processing operations.	Approximately 19 high-pressure gas fills/processing operations.	Approximately 25 high-pressure gas fills/processing operations.	Approximately 25 high-pressure gas fills/processing operations.	Approximately 25 high-pressure gas fills/processing operations were conducted in 2002.
Gas Boost System Testing and Development: WETF	System testing and gas processing operations involving quantities of up to 100 grams. Capability used ~35 times per year.	Approximately 25 gas boost tests and operations.	Approximately 14 gas boost tests and operations.	Approximately 10 gas boost tests and operations.	Approximately 30 gas boost tests and operations.	Approximately 20 gas boost tests and operations.
Cryogenic Separation: TSTA	Tritium gas purification and processing in quantities up to 200 grams. Capability used five to six times per year.	One cryogenic separation operation.	One cryogenic separation operation.	One cryogenic separation operation.	This capability was disabled at TSTA and will no longer be used. A system to separate hydrogen isotopes using a chromatographic process was tested. The testing did not use tritium.	This capability was disabled at TSTA and will no longer be used.
Diffusion and Membrane Purification: TSTA, TSFF, WETF	Research on tritium movement and penetration through materials. Expect six to eight experiments per month. Capability also used continuously for effluent treatment.	Approximately five to eight experiments per month. Capability not used for continuous effluent treatment.	Approximately zero. Capability not used for continuous effluent treatment.	Capability not used in 2000.	Capability not used in 2001.	Capability not used in 2002.
Metallurgical and Material Research: TSTA, TSFF, WETF	Capability involves materials research including metal getter research and application studies. Small quantities of tritium support tritium effects and properties research and development. Contributes <2% of LANL's tritium emissions to the environment.	Activities resulted in <1% tritium emissions from each facility.	Activities resulted in <1% tritium emissions from each facility.	Activities resulted in <1% tritium emissions from each facility.	Activities resulted in <1% tritium emissions from each facility.	Activities resulted in <1% tritium emissions from each facility.

Table 2.2.2-1. Tritium Facilities/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Thin Film Loading: TSFF (WETF by 2001)	Chemical bonding of tritium to metal surfaces. Current application is for tritium loading of neutron tube targets; perform loading operations up to 3,000 units per year.	Approximately 600 units were loaded. Operations occurred at both TSFF and WETF.	Approximately 600 units were loaded. Operations occurred at TSFF and WETF.	Approximately 600 units were loaded. Operations occurred at TSFF.	Approximately 900 units were loaded. Operations occurred at TSFF.	Approximately 1,100 units were loaded. Operations occurred at TSFF.
Gas Analysis: TSTA, TSFF, WETF	Analytical support to current capabilities. Operations estimated to contribute <5% of LANL's tritium emissions to the environment.	Gas analysis operations were continued at all three facilities. No changes in facility emissions occurred from this activity.	Gas analysis operations were continued at all three facilities. No changes in facility emissions occurred from this activity.	Gas analysis operations were continued at all three facilities. No changes in facility emissions occurred from this activity.	Gas analysis operations were continued at all three facilities. No changes in facility emissions occurred from this activity.	Gas analysis operations were continued at all three facilities. No changes in facility emissions occurred from this activity.
Calorimetry: TSTA, TSFF, WETF	This capability provides a measurement method for tritium material accountability. Contained tritium is placed in the calorimeter for quantity measurements. This capability is used frequently, but contributes <2% of LANL's tritium emissions to the environment.	Calorimetry activities were continued at WETF and TSFF. No changes occurred in facility emissions from this activity.	Continues at WETF and TSFF. No changes occurred in facility emissions from this activity.	Continues at WETF and TSFF. No changes occurred in facility emissions from this activity.	Calorimetry activities were conducted at WETF and TSFF. No changes occurred in facility emissions from this activity.	Calorimetry activities were conducted at WETF and TSFF. No changes occurred in facility emissions from this activity.
Solid Material and Container Storage: TSTA, TSFF, WETF	Storage of tritium occurs in process systems, process samples, inventory for use, and as waste. Onsite storage could increase by a factor of 10 over levels identified during preparation of the SWEIS, with most of the increase occurring at WETF.	The storage at TSTA and TSFF remained constant. The storage at WETF has increased by ~10% over levels identified during preparation of the SWEIS.	The storage at TSTA and TSFF remained constant. The storage at WETF has increased by ~10% over levels identified during preparation of the SWEIS.	The storage at TSTA and TSFF remained constant. The storage at WETF has increased by ~10% over levels identified during preparation of the SWEIS.	The storage at TSTA and TSFF decreased. The storage at WETF has increased by ~5% over levels identified during preparation of the SWEIS.	The storage at TSTA and TSFF decreased. The storage at WETF has increased by ~5% over levels identified during preparation of the SWEIS.

[a] Includes the remodel of Building 16-450 to connect it to WETF in support of neutron tube target loading.

2.2.3 Operations Data for the Tritium Facilities

Neither TRU nor mixed TRU waste was generated in 2000 and 2001. From 1998 through 2002, most data for operations at the Tritium Facilities were slightly below levels projected by the SWEIS ROD. An exception to this was the airborne releases of elemental tritium from WETF. During January 2001, approximately 7,600 curies of elemental tritium were released from the facility during a single event. The other exceptions are the generation of 2,615 kilograms and 5,164 kilograms of chemical waste in 2001 and 2002 from WETF. In 2001, 2,353 kilograms of chemical waste were generated from refrigerant replacement at TA-16-450. The 2002 waste volume is 3,464 kilograms over the amount projected in the SWEIS ROD. Over 4,000 kilograms of the 2002 chemical waste were generated from refrigerant replacement at TA-16-450.

The outfall flows at the Tritium Facilities were below levels projected in the ROD for 1998 and 1999. (Appendix D provides information on outfall usage at LANL.) In 2000, the NPDES outfall discharges from TA-21 were significantly higher than those projected by the SWEIS ROD. This increase was a result of the methods used for estimating the flow. These outfalls discharge on a batch flow basis and one is seasonally out of service. However, the Discharge Monitoring Reports from the Water Quality and Hydrology group are based on infrequent sampling and assume round-the-clock flow, thus substantially overestimating the actual discharge flow. With the 2001 implementation of the newly issued NPDES permit, the Water Quality and Hydrology group has been able to acquire direct flow measurements for all outfalls enabling the use of real data instead of estimates.

During 2001, the cross-country transfer line, dedicated to the transfer of radioactive liquid wastes from the TA-21 Tritium Facilities to the TA-50 RLWTF, was taken out of service, flushed, drained, and capped. Environmental protection was the primary reason for removing this pipeline from service; it was a single-walled pipe for its entire length (~two miles). Reduction of radioactive liquid waste volumes generated at the TA-21 facilities enabled the line to be taken out of service; the smaller volumes can now be transported from TA-21 to TA-50 or TA-53 by truck. The TSTA cooling tower blowdown was changed from the liquid radioactive waste system to the outfall on the southwest end of TA-21, Building 209.

During 2002, the cross-country transfer line was mostly removed as part of land transfer. Operational data from 1998 through 2002 are summarized in Table 2.2.3-1. The 2002 TSTA releases for tritium in water vapor were greater than estimated in the ROD because of the deactivation activities.

2.2.4 Cerro Grande Fire Effects at the Tritium Facilities

Threat of wildfire caused the Laboratory to close on Monday, May 8, 2000, and enter emergency operations. Because the closure was on a Monday, the Tritium Facilities were already in a safe condition from being in safe weekend configuration. During the fire, no damage was incurred at the Tritium Facilities. While TA-21 facilities were only remotely threatened by fire, the fire burned up to and around WETF at least three times. Because of previous fuel thinning at TA-16 around the WETF and onsite fire support during the fire, no facility or office structures were damaged.

During the Laboratory closure, the safety systems at the Tritium Facilities remained operational and the facilities remained in safe weekend configuration. The Tritium Facilities were never placed into shutdown mode. Facility operations personnel responded several times to facility alarms and maintenance needs. No increase in tritium emission occurred as a result of the fire. Restoration of full operating capabilities (returning to operations) of the Tritium Facilities proceeded without problems or delays.

A lessons-learned exercise was conducted after the fire with Tritium Facilities personnel. This resulted in several suggestions for personnel and system improvements that will improve safety should a similar incident occur in the future.

Table 2.2.3-1. Tritium Facilities (TA-16 and TA-21)/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Radioactive Air Emissions:							
• TA-16, WETF, Elemental tritium	Ci/yr	3.0E+2	2.3E+1	2.4E+1	3.9E+1	7.7E+3	3.0E+2
• TA-16, WETF, Tritium in water vapor	Ci/yr	5.0E+2	2.2E+2	1.4E+2	2.2E+2	2.0E+2	1.0E+2
• TA-21, TSTA, Elemental tritium	Ci/yr	1.0E+2	1.3E+1	1.7E+1	2.5E+1	7.1E+0	4.1E+1
• TA-21, TSTA, Tritium in water vapor	Ci/yr	1.0E+2	6.9E+1	4.9E+1	1.5E+2	5.8E+1	4.8E+2
• TA-21, TSFF, Elemental tritium	Ci/yr	6.4E+2	7.3E+1	9.2E+1	2.5E+2	3.1E+1	2.6E+1
• TA-21, TSFF, Tritium in water vapor	Ci/yr	8.6E+2	3.1E+2	3.3E+2	5.1E+2	3.9E+2	5.8E+2
NPDES Discharge:							
Total Discharges	MGY	0.3	13.7	8.97	8.6	0.3932 [b]	13.4000
• 05S (Sewage Treatment Plant, TA-21) [a]	MGY	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
• 02A-129 (TA-21)	MGY	0.1	13.0	8.83	7.9	0.3902 [b]	10.8400
• 03A-036 (TA-21) [a]	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
• 03A-158 (TA-21)	MGY	0.2	0.7	0.14 [c]	0.7	0.00300	2.5600
• 04A-091 (TA-16) [a]	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
Wastes:							
Chemical	kg/yr	1,700	195	30	10	2,615 [d]	5,164 [e]
LLW	m^3/yr	480	46	47	49	0	90
MLLW	m^3/yr	3	0.1	0	0	0.01	0.8
TRU	m^3/yr	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0
Number of Workers	FTEs	123 [f] 28 [f]	31 [f]	28 [f]	24 [f]	25 [f]	20 [f]

[a] Outfalls eliminated before 1999: 05S (TA-21), 03A-036 (TA-21), and 04A-091 (TA-16). Consolidation and removal of outfalls has resulted in projected NPDES volumes underestimating actual discharges from the exiting outfalls.

[b] Discharge quantity is not considered significantly different from the SWEIS ROD.

[c] This outfall only discharged two quarters during CY 1999.

[d] During CY 2001, 2,350 kilograms of the chemical waste are from refrigerant replacement at TA-16-450.

[e] Over 4,000 kilograms of the chemical waste in CY 2002 are from refrigerant replacement at TA-16-450.

[f] The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for CY 1998 through CY 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the 10-year window represented by the SWEIS ROD.

Tree-thinning operations on Two-Mile Mesa

2.3 Chemistry and Metallurgy Research Building (TA-03)

The CMR Building Key Facility was designed and constructed in 1952 to house analytical chemistry, plutonium metallurgy, uranium chemistry, engineering design, and drafting. However, at the time the SWEIS ROD was issued, CMR was described as "a production, research, and support center for actinide chemistry and metallurgy research and analysis, uranium processing, and fabrication of weapon components." It consists of a main building (TA-03-29) and a radioactive liquid waste pump house, TA-03-154. The CMR consists of three floors: a basement, first floor, and an attic. It has seven independent wings connected by a common corridor. Throughout its history, the CMR has operated as a category 2 nuclear facility.

As shown in Table 2.3-1, DOE has identified the CMR facility, in various levels of detail, as a Category 2 nuclear facility since the publication of the SWEIS ROD.

Table 2.3-1 CMR Building with Nuclear Hazard Classification

BUILDING	DESCRIPTION	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [a]
TA-03-0029	CMR	2		2		2	2
TA-03-0029	Radiochemistry Hot Cell		2	2	2		
	Actinide chemistry and metallurgy research and analysis					2	
TA-03-0029	SNM Vault		2	2	2		
TA-03-0029	Nondestructive analysis/nondestructive examination Waste Assay		2	2	2		
TA-03-0029	IAEA Classroom [f]			2	2		
TA-03-0029	Wing 9 (Enriched Uranium)		2	2	2		

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
[c] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
[d] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
[e] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)
[f] The IAEA (International Atomic Energy Agency) Classroom was used to conduct Nonproliferation Training. In CY 2001, this capability was moved to Pajarito Site (TA-18) and renamed the "Nuclear Measurement School." However, the capability was returned to and operated in CMR in CY 2002.

2.3.1 Construction and Modifications at the CMR Building

The ROD projected five facility modifications by December 2005:

- Phase I Upgrades to maintain safe operating conditions for 5–10 years;
- Phase II Upgrades (except seismic) to enable operations for an additional 20–30 years;
- modifications for production of targets for the molybdenum-99 medical isotope;
- modifications for the recovery of sealed neutron sources; and
- modifications for safety testing of pits in the Wing 9 hot cells.


Alpha box insert for a hot cell

During the 1996–1998 time period, only the Phase I Upgrades were in progress. By the end of 1998, all 11 of these upgrades had been started, but only five of the 11 Phase I Upgrades were completed. Concurrently, in August 1998, DOE approved the CMR Basis for Interim Operations, and in the fall of 1998, DOE determined that extensive upgrades to CMR would not be cost effective.

In 1999, DOE directed the CMR Upgrades Project to re-baseline including only those upgrades needed to ensure compliance with the Basis for Interim Operations. These upgrades were required for the facility to be reliable through 2010. During 1999, some work was done on the remaining Phase I Upgrades and three of the 13 Phase II Upgrades. Under the Phase I Upgrades, work on the continuous air monitors in the building wings was completed; work on the wing electrical systems and the interim improvements to the duct washdown system continued; and work on the power distribution system, the stack monitoring system, and the improvements to acid vents and drains stopped. Under the Phase II Upgrades, the standby power for the operations center was not completed. This project was removed during re-baselining and the upgrades to both the operations center and the fire protection system were in progress.

The new baseline was approved in October 1999 and included 16 upgrades necessary to ensure worker safety, public safety, environmental compliance, and reliability of services to safety systems. Table 2.3.1-1 identifies these 16 upgrades and their status during 2002. The table also indicates additional modifications at CMR.

All 16 upgrades under the re-baselining were completed by March 2002; the Project submitted all Turnover/Closeout documentation to DOE in July 2002; and the DOE approved Turnover/Closeout in November 2002.

2.3.2 Operations at the CMR Building

The eight capabilities identified in the SWEIS for the CMR Facility are presented in Table 2.3.2-1. No new capabilities have been added, but one capability (Nonproliferation Training) was removed from CMR in 2000 and relocated back to CMR from TA-18 in 2002.

2.3.3 Operations Data for the CMR Building

Operations data from research, services, and production activities at the CMR Building were well below those projected by the SWEIS ROD. Radioactive air emissions were less than one curie per year from 1998 through 2002 (compared to 1,645 projected)—principally because processing of irradiated molybdenum-99 targets in the hot cells did not occur. Of the wastes generated, only TRU waste in 2001 and mixed TRU in 1998 and 2002 have exceeded SWEIS ROD projections; the others remained low, ranging from about 2 percent to about 25 percent of these projections. The TRU and mixed TRU wastes were above projections due to remodeling activities. Table 2.3.3-1 provides details of these and other operational data.

2.3.4 Cerro Grande Fire Effects at the CMR Building

Cerro Grande Fire effects on the CMR Building and its associated operations were minimal. Programs did suffer downtime and loss of productivity during the evacuation. No direct fire damage occurred and recovery was limited to cleaning or replacement of air system filters.

CMR Building

Table 2.3.1-1. CMR Building Construction and Modifications

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION						
	DESCRIPTION OF UPGRADES/ MODIFICATIONS	1998 YEARBOOK	1999 YEARBOOK [a]	2000 YEARBOOK [b]	2001 YEARBOOK	2002 YEARBOOK	2002 COMPLETION STATUS OF UPGRADES
Phase I Upgrades to maintain safe operating conditions for 5 to10 years	Phase I Upgrades:	Five of the 11 Phase I Upgrades completed by end of 1998.	Six of the 11 Phase I Upgrades completed by end of 1999.				Phase I Upgrades were re-baselined in 1999.
	Continuous Air Monitors	95% complete 1. Continuous air monitors in building wings.	95% complete.				Installed, but never became operational.
	Heating, ventilation, and air conditioning (HVAC) blowers and motors (Wing 7 only, balance moved to Phase II)	100% complete 2. HVAC blowers.					Cancelled; became out of scope.
	Electrical	80% complete 3. Wing electrical systems.	80% complete, work continuing.				Modified and completed.
		70% complete 4. Power distribution system.	70% complete, work stopped.				Cancelled.
	Stack monitors	90% complete 5. Stack monitoring system.	90% complete, work stopped.				Completed; modified.
	Uninterruptible power supply	100% complete 6. Uninterruptible power supply for stack monitors in wings.					Incomplete; out of scope with re-baselining. Never turned over.
	Duct Work Modification	90% complete 7. Interim improvements to the duct washdown system.	90% complete, continuing.				Out of scope with re-baselining.
	Acid Vents and Drains (Immediate repairs, remaining scope moved to Phase II)	40% complete 8. Improvements to acid vents and drains.	40% complete, work stopped.				Out of scope with re-baselining.

Table 2.3.1-1. CMR Building Construction and Modifications (continued)

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION						
	DESCRIPTION OF UPGRADES/ MODIFICATIONS	1998 YEARBOOK	1999 YEARBOOK [a]	2000 YEARBOOK [b]	2001 YEARBOOK	2002 YEARBOOK	2002 COMPLETION STATUS OF UPGRADES
	Sanitary Sewer	100% complete 9. Modify the sanitary sewer system.					Completed–plugged drains.
	Fire Protection (Title 1/Fire Hazard Analysis, remaining scope moved to Phase 2)	100% complete 10. Fire hazard analysis.					Fire Hazard Analysis completed.
	Engineering Assessment/CDR & EA	100% complete. 11. Engineering assessment and conceptual design.					Completed.
	Safety Analysis Report	Basis for Interim Operation completed August 1998.					Basis for Interim Operation completed August 1998.
Phase II Upgrades (except seismic) to enable operations for an additional 20 to 30 years	Phase II Upgrades:		Progress was made on 3 of the original 13 Phase II Upgrades during 1999.				
	Seismic/Tertiary Confinement						Out of scope with re-baselining.
	Security Related to Tertiary Confinement						Out of scope with re-baselining.
	Ventilation/Confinement Zone Separation						Out of scope with re-baselining.
	Operation Center		25% complete.	0% complete, in design.	80% complete, construction.	100% completed.	Modified; completed.
	Standby Power/Communications						Modified; completed.
	Wing 1 HVAC Upgrades (includes Decontamination)						Out of scope with re-baselining.
	Wing 2 and 4 Safe Standby						Out of scope with re-baselining.

Table 2.3.1-1. CMR Building Construction and Modifications (continued)

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION						
	DESCRIPTION OF UPGRADES/ MODIFICATIONS	1998 YEARBOOK	1999 YEARBOOK [a]	2000 YEARBOOK [b]	2001 YEARBOOK	2002 YEARBOOK	2002 COMPLETION STATUS OF UPGRADES
	Chilled Water Upgrades						Incomplete; out of scope with re-baselining.
	Main Vault Upgrades						Out of scope with re-baselining.
	Acid Vent and Drains (beyond Phase I)						Out of scope with re-baselining.
	Fire Protection Upgrades		25% complete.	40% complete, in design.	100% complete.	100% completed.	Modified; completed.
	Exhaust Wash Down Recycle						Out of scope with re-baselining.
	Standby Power for Operation Center		100% complete.				Completed.
	Modifications under Rebaselining						
	Motor Control Centers	Completed.					
	Fire Alarm Control Panels		Completed.				
	Transient Combustible Loading		Completed.				
	Air Compressors Replacement			80% complete, in construction.	100% completed.		
	HVAC Delta P Indicators			100% completed.			
	Duct Wash Down System Assessment	Completed.					
	Duct Wash Down System Design and Construction			75% complete, in construction.	100% completed.		
	Stack Monitors FE 14, 19, 20, 23, 24, 28, and 32 (Phase A)			100% completed.			
	Emergency Personnel Accountability System			60% complete, in construction.	95% complete, turnover.	100% completed.	
	Wing 9 Ventilation Assessment		Completed.				
	Ventilation System Filter Replacement Assessment			Completed.			

Table 2.3.1-1. CMR Building Construction and Modifications (continued)

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION						
	DESCRIPTION OF UPGRADES/ MODIFICATIONS	1998 YEARBOOK	1999 YEARBOOK [a]	2000 YEARBOOK [b]	2001 YEARBOOK	2002 YEARBOOK	2002 COMPLETION STATUS OF UPGRADES
	Hood Wash Down			65% complete, in construction.	100% completed.		
	Stack Monitors FE 15, 29, and 33 (Phase B)			90% completed.	100% completed.		
	Emergency Lighting			55% complete, in construction.	100% completed.		
	1952 Sprinkler Head Replacement			100% completed.			
	Ventilation System Filter Replacement Design and Construction (Wing 9)			45% complete, in design.	100% completed.		
	West Bank Hot Cell Controls/Radiation Monitors			40% complete, in design.	95% complete, turnover.	100% completed.	
	West Bank Hot Cell Delta P Indicators			55% complete, in design.	95% complete, turnover.	100% completed.	
	Fire Protection System			40% complete, in design.	100% complete.	100% completed.	
	Emergency Notification			35% complete, in design.	90% complete, turnover.	100% completed.	
	Operations Center			0% complete, in design.	80% complete, construction.	100% completed.	
	Internal Power Distribution			40% complete, in design.	90% complete, turnover.	100% completed.	
Modifications for production of targets for the molybdenum-99 medical isotope							Incomplete–inactive project.
Modifications for the recovery of sealed neutron sources							Incomplete–inactive project.
Modifications for safety testing of pits in the Wing 9 hot cells							Incomplete–inactive project

Table 2.3.1-1. CMR Building Construction and Modifications (continued)

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION						
	DESCRIPTION OF UPGRADES/ MODIFICATIONS	1998 YEARBOOK	1999 YEARBOOK [A]	2000 YEARBOOK [B]	2001 YEARBOOK	2002 YEARBOOK	2002 COMPLETION STATUS OF UPGRADES
	Other/additional modifications:						
	East Bank Hot Cell Controls/Radiation Monitors						Completed.
	East Bank Hot Cell Delta P Indicators						Completed.
	Wing 9 Modifications for Bolas Grande						Started.
	Wing 3 Modifications for Bolas Grande						Started.
	Material Recovery in Wing 9						Started.
	Clean-out of Waste Storage Tanks						Started.

[a] During 1999, Phase I and II Upgrades were re-baselined to include only those needed to ensure compliance with the Basis of Interim Operations.
[b] Construction disrupted by Cerro Grande Fire.

Table 2.3.2-1. CMR Building (TA-03)/Comparison of Operations

CAPABILITY	SWEIS ROD[a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Analytical Chemistry	Sample analysis in support of a wide range of actinide research and processing activities. Approximately 7,000 samples per year.	Approximately 4,000 samples were analyzed.	Approximately 2,926 samples were analyzed.	Approximately 2,150 samples were analyzed.	Approximately 2,500 samples were analyzed.	Approximately 2,800 samples were analyzed.
Uranium Processing	Activities to recover, process, and store LANL highly enriched uranium inventory by 2005. Includes possible recovery of materials resulting from manufacturing operations.	No activity.	Activities to recover and process highly enriched uranium were performed. Three shipments to Y-12 involved packaging and repackaging.	Activities to recover and process highly enriched uranium were performed. Four to five shipments were made to Y-12.	Highly enriched uranium was repackaged. Five shipments were made to Y-12 at Oak Ridge National Laboratory. Other material was moved to TA-18.	Highly enriched uranium was repackaged. Two batches of solid uranium nitrate hexahydrate (UNH) were converted to triuranium octocide (U_3O_8). Also three batches of UNH liquids were converted to U_3O_8. All items are from TA-18.
Destructive and Nondestructive Analysis	Evaluate 6 to 10 secondaries per year through destructive/ nondestructive analyses and disassembly.	Performed nondestructive analysis on two secondaries.	Performed nondestructive analysis on less than 10 secondaries.	No activity. Project is no longer active, and capability was not used in 2000.	No activity. Project is no longer active, and capability was not used in 2001.	No activity. Project is no longer active, and capability was not used in 2002.
Nonproliferation Training	Nonproliferation training involving SNM. No additional quantities of SNM, but may work with more types of SNM than present during preparation of the SWEIS.	No activity. Project inactive.	Five weeks of SNM nonproliferation training conducted. Two weeks involved Category 2 quantities of SNM.	Training was conducted in August 2000. This capability was moved back to TA-18, and no more training is planned at CMR Building because of a change in status.	This capability was moved back to TA-18, and no more training is planned at CMR Building because of a change in status.	This capability returned to CMR and operated at CMR during 2002.

Table 2.3.2-1. CMR Building (TA-03)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD [a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Actinide Research and Processing [b]	Process up to 5,000 Ci/yr plutonium-238/beryllium and americium-241/beryllium neutron sources. Process neutron sources other than sealed sources. Stage up to 1,000 Ci/yr plutonium-238/beryllium and americium-241/beryllium sources in Wing 9 floor holes.	Received a few small-quantity sources. Level well below that projected by the SWEIS ROD.	No source processing activity.	No activity.	No activity.	No activity.
	Introduce research and development effort on spent nuclear fuel related to long-term storage and analyze components in spent and partially spent fuels.	No activity.	No activity.	No activity.	Analyzed ~50 samples in 2001.	
	Metallurgical microstructural/ chemical analysis and compatibility testing of actinides and other metals. Primary mission to study long-term aging and other material effects. Characterize about 100 samples per year. Conduct research and development in hot cells on pits exposed to high temperatures.	Metallurgical microstructural/ chemical analysis and compatibility testing of actinides and other metals. Primary mission to study long-term aging and other material effects. Characterize about 100 samples per year. Conduct research and development in hot cells on pits exposed to high temperatures.	Performed microstructural characterization tests on ~50 samples. No research and development on pits exposed to high temperatures.	Performed microstructural characterization tests on ~50 samples containing less than 20 grams of plutonium per sample. No research and development on pits exposed to high temperatures.	Performed microstructural characterization tests on ~200 samples containing less than 20 grams of plutonium per sample.	Performed microstructural characterization tests on ~200 samples containing less than 20 grams of plutonium per sample.

Table 2.3.2-1. CMR Building (TA-03)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
	Analysis of TRU waste disposal related to validation of the Waste Isolation Pilot Plant (WIPP) performance assessment models. TRU waste characterization. Analysis of gas generation such as could occur in TRU waste during transportation to WIPP. Performance Demonstration Program to test nondestructive analysis/nondestructive examination equipment. Demonstrate actinide decontamination technology for soils and materials. Develop actinide precipitation method to reduce mixed wastes in LANL effluents.	No decontamination technology activity. Studies on TRU waste and WIPP performance assessment models ongoing.	Final analysis conducted on experiments.	Decontamination performed on 15 drum scales, and decontamination was started on 34 liter drum scales. This operation is expected to terminate in 2001.	This is no longer an ongoing program.	No activity. Project was terminated.
Fabrication and Metallography	Produce 1,080 targets per year, each containing ~20 grams uranium-235, for the production of molybdenum-99, plus an additional 20 targets/wk for 12 weeks. Separate fission products from irradiated targets to provide molybdenum-99. Ability to produce 3,000 six-day curies of molybdenum-99/wk.[c]	Coated ~300 targets for molybdenum-99.	No work performed.	No activity. Project was terminated.	No activity. Project was terminated.	No activity. Project was terminated.

Table 2.3.2-1. CMR Building (TA-03)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
	Support complete highly enriched uranium processing, research and development, pilot operations, and casting. Fabricate metal shapes, including up to 50 sets of highly enriched uranium components, using 1 to 10 kg highly enriched uranium per operation. Material recovered and retained in inventory. Up to 1,000 kg annual throughput.	No activity.	No activity.	No activity.	No activity.	No activity.

[a] Includes completion of Phase I and Phase II Upgrades, except for seismic upgrades, modifications for the fabrication of molybdenum-99 targets, modifications for the Radioactive Source Recovery Program, and modification for safety testing of pits.

[b] The actinide activities at the CMR Building and at TA-55 are expected to total 400 kg/yr. The future split between these two facilities is not known, so the facility-specific impacts at each facility are conservatively analyzed at this maximum amount. Waste projections, which are not specificto the facility (but are related directly to the activities themselves), are only projected for the total of 400 kg/yr.

[c] Molybdenum-99 is a radioactive isotope that decays to form metastable technetium-99, a radioactive isotope that has broad applications in medical diagnostic procedures. Both isotopes are short-lived, with half-lives (the time in which the quantity of the isotope is reduced by 50 percent) of 66 hours and 6 hours, respectively. These short half-lives make these isotopes both attractive for medical use (minimizes the radiation dose received by the patient) and highly perishable. Production of these isotopes is therefore measured in “six-day curies,” the amount of radioactivity remaining after six days of decay, which is the time required to produce and deliver the isotope to hospitals and other medical institutions.

Table 2.3.3-1. CMR Building (TA-03)/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Radioactive Air Emissions:							
Total Actinides[a]	Ci/yr	7.60E-4	2.62E-5	3.0E-5	1.0E-5	5.9E-8	2.7E-5
Selenium-75	Ci/yr	Not projected	6.66E-6	Not detected	Not detected	Not detected	Not detected
Krypton-85	Ci/yr	1.00E+2	Not measured	Not measured [b]	Not measured [b]	Not measured [b]	Not measured
Xenon-131m	Ci/yr	4.50E+1	Not measured	Not measured [b]	Not measured [b]	Not measured [b]	Not measured
Xenon-133	Ci/yr	1.50E+3	Not measured	Not measured [b]	Not measured [b]	Not measured [b]	Not measured
Tritium Water	Ci/yr	Negligible	Not measured	Not measured [b]	Not measured [b]	Not measured [b]	Not measured
Tritium Gas	Ci/yr	Negligible	Not measured	Not measured [b]	Not measured [b]	Not measured [b]	Not measured
Technetium-99	Ci/yr	Not projected [c]	Not measured	9.2E-4	Not measured	Not measured	Not measured
NPDES Discharge:							
Number of outfalls	---	1	1	1	1	1	1
Total Discharge	MGY	0.53	3.2	4.45	2.28	0.02090	0.76
03A–021 [d]	MGY	0.53	3.2	4.45	2.28	0.02090	0.76
Wastes:							
Chemical	kg/yr	10,800	3,313	4,824	1,837	676	707
LLW [e]	m^3/yr	1,820	124	184	264	448	389
MLLW	m^3/yr	19	3.2	0.4	0.3	0.4	0.9
TRU	m^3/yr	28 [f]	12.7	8.9	24.8	46.5	10.2
Mixed TRU	m^3/yr	13 [f]	15.8	1.9	1	0.8	16.7
Number of Workers	FTEs	367 [g] 204 [g]	218 [g]	204 [g]	190 [g]	192 [g]	201 [g]

a Includes uranium, plutonium, americium, and thorium.

b Potential emissions during the period were sufficiently small that measurement of these radionuclides was not necessary to meet facility or regulatory requirements.

c The radionuclide was not projected in the ROD because it was either dosimetrically insignificant or not isotopically identified.

d This outfall discharged all four quarters during CY 1999.

e Wastes (e.g., 4,000 cubic meters LLW) from the Phase II CMR Upgrades are included.

f The SWEIS provided the data for TRU and mixed TRU wastes in Chapter 3 and Chapter 5. However, the projections made had to be modified to reflect the decision to produce nominally 20 pits per year.

g The first number shown in the “SWEIS ROD” column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the “SWEIS ROD” column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for CY 1998 through CY 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 1998 through 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the 10-year window represented by the SWEIS ROD.

2.4 Pajarito Site (TA-18)

The Pajarito Site Key Facility is located entirely at TA-18. Principal activities are design and performance of nuclear criticality experiments and detector development in support of emergency response, nonproliferation, and arms control.

The SWEIS defined the facility as having a main building (18-30), three outlying, remote-controlled critical assembly buildings then known as “kivas” (18-23, -32, -116), and a number of additional support buildings, including the hillside vault (18-26). During 2000, in response to concerns expressed by two Native American Indian Pueblos (Santa Ana and Picuris), the term “kiva” (which has religious significance to these Native Americans), was replaced with the acronym CASA (Critical Assembly and Storage Area).

As shown in Table 2.4-1, DOE lists this whole Key Facility as a Category 2 facility and identifies seven buildings with nuclear hazard classification. The four buildings identified in the SWEIS (TA-18-23, -26, -32, and -116) have remained Category 2 nuclear facilities. The additions represent buildings with inventories meeting the current nuclear facility classification guidelines. It is interesting to note that the IAEA classroom (Building TA-18-258) represents a capability that was originally at TA-18, transferred to the CMR Building, and then brought back to TA-18 in 2000. The IAEA schools have been returned to CMR in 2002. All other schools remain at TA-18.

The new Authorization Basis, comprised of a Basis of Interim Operation document and Technical Safety Requirements, was submitted to NNSA on March 14, 2002, and approved by NNSA on July 31, 2002. Implementation of the new Authorization Basis, including the Technical Safety Requirements, is in progress and scheduled to be completed by June 2004. The new Authorization Basis adds safety measures to TA-18 operations in the form of both engineered and administrative controls.

Table 2.4-1. Pajarito Site Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]
TA-18	Site Itself		2	2	2	2	2
TA-18-0023	SNM Vault (CASA 1)	2	2	2	2	2	
TA-18-0026	Hillside Vault	2	2	2	2	2	
TA-18-0032	SNM Vault (CASA 2)	2	2	2	2	2	
TA-18-0116	Assembly Building (CASA 3)	2	2	2	2	2	
TA-18-0127	Accelerator used for weapons x-ray		2	2	2	2	
TA-18-0129	Calibration Laboratory		2	2	2	2	
TA-18-0247	Sealed Sources		3	3			
TA-18-0258	IAEA Classroom (Trailer) [f]		2				

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
[c] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
[d] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
[e] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)
[f] The IAEA Classroom was used to conduct Nonproliferation Training. In CY 2001, this capability was moved to Pajarito Site (TA-18) and renamed the “Nuclear Measurement School.” However, the capability was returned to and operated in CMR in CY 2002.

2.4.1 Construction and Modifications at the Pajarito Site

Projected: The SWEIS ROD projected replacement of the portable linac machine.

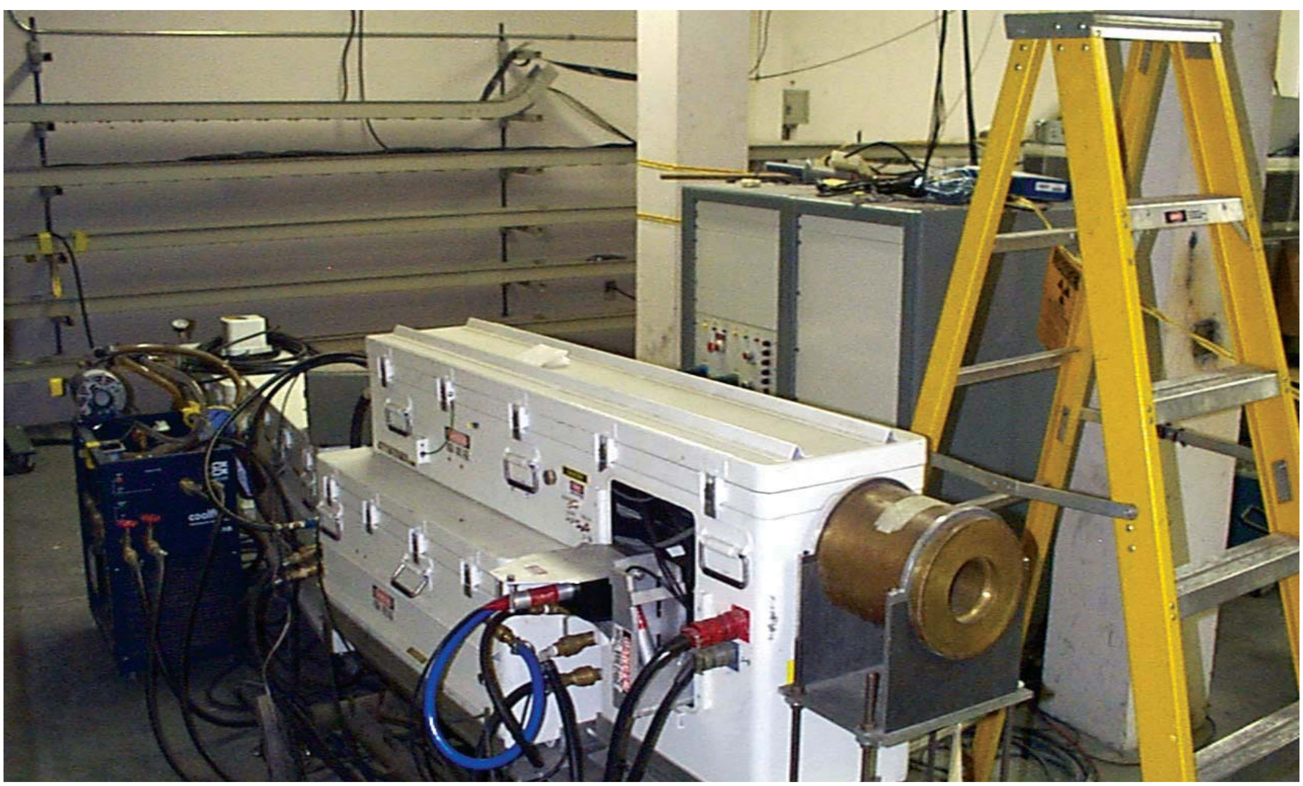
Actual: The portable linac has not been replaced. Construction projects for 2001 consist of the installation of two office trailers (Buildings 300 and 301) and security enhancements. In 2002, a cable tray relocation occurred (DOE 2001a).

Proposed: The environmental impact statement ROD for TA-18 relocation was issued for public comment on August 30, 2002, listing the Device Assembly Facility at the Nevada Test Site as the preferred alternative. The ROD was approved on December 5, 2002 (DOE 2002b).

Table 2.4.1-1 indicates the construction and modifications that have occurred at TA-18.

Table 2.4.1-1. Pajarito Site Construction and Modifications

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Replacement of the portable linac	Not done.	Not done.	Not done.	Not done.	Not done.
				Installation of two office trailers (Buildings 300 and 301)	
				Security enhancements	
					Cable tray relocation (DOE 2001a).



An accelerator

2.4.2. Operations at the Pajarito Site

The SWEIS identified nine capabilities for this Key Facility. No research capabilities have been deleted. However, the Nuclear Measurement School (IAEA classroom returned to CMR) that was originally moved from TA-18 to CMR (before the SWEIS), was moved back to TA-18 in 2000 and then returned to CMR in 2002.

The TA-18 facility experienced a safety stand down on August 12, 1998, that lasted into April 1999. As a result, only a limited number (54) of criticality experiments were performed during 1998, along with more than 100 subcritical tests. This total of 154 experiments is approximately a factor of seven below the ROD projection of a maximum of 1,050 experiments in any given year.

Since 1999, the facility has experienced normal operations. TA-18 conducted 188 criticality experiments in 1999 and a total of 140 in both 2000 and 2001. The TA-18 facility experienced normal operations during 2002, except for the Solution High-Energy Burst Assembly (SHEBA) critical assembly that was on operational downtime starting August 2000. SHEBA was restarted in February 2003. The TA-18 facility conducted 160 criticality experiments in 2002. This total of 160 experiments represents only about 15 percent of the SWEIS ROD projection of a maximum of 1,050 experiments in any given year.

In addition, the nuclear material inventory level has remained below the SWEIS ROD projection. For 2002 the material inventory was reduced by 10 percent, and there was not a significant increase in nuclear weapons components and materials at the facility. Table 2.4.2-1 provides details.

Examining hemispheres

Table 2.4.2-1. Pajarito Site (TA-18)/Comparison of Operations

CAPABILITIES	SWEIS ROD[a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Dosimeter Assessment and Calibration	Perform up to 1,050 criticality experiments per year.	Performed 54 experiments.	Performed 188 experiments.	Performed 140 experiments.	Performed 140 experiments.	Performed 140 experiments.
Detector Development	Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%, and replace portable linac.	Same activities as in 1995. Increased nuclear materials inventory by 5%. Did not replace the portable accelerator.	Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999. Did not replace the portable linac.	Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999, and a 15% increase in 2000. Did not replace the portable linac.	The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory. Did not replace the portable linac.	The nuclear materials inventory for 2002 was approximately the same as the 2001 inventory. Did not replace the portable linac.
Materials Testing	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing.	Performed 54 experiments.	Performed 188 experiments.	Performed 140 experiments.	Performed 140 experiments.	Performed 160 experiments.
Subcritical Measurements	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%.	Performed 54 experiments. Increased nuclear materials inventory by 5%.	Performed 188 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999.	Performed 140 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999, and a 15% increase in 2000. The SKUA critical assembly was de-fueled at DOE's request and is no longer available for criticality experiments.	Performed 140 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory. The SKUA critical assembly was de-fueled at DOE's request and is no longer available for criticality experiments.	Performed 160 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory. The SKUA critical assembly was de-fueled at DOE's request and is no longer available for criticality experiments. All expected SKUA material shipments will be completed by May 2003.

Table 2.4.2-1. Pajarito Site (TA-18)/Comparison of Operations (continued)

CAPABILITIES	SWEIS ROD[a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Fast-Neutron Spectrum	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%, and increase nuclear weapons components and materials.	Performed 54 experiments. Increased nuclear materials inventory by 5%. Slight increase in nuclear weapons components and materials.	Performed 188 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999. Slight increase in nuclear weapons components and materials in 1998, no additional increase in 1999.	Performed 140 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999, and a 15% increase in 2000. Slight increase in nuclear weapons components and materials in 1998, no additional increase in 1999.	Performed 140 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory. Slight increase in nuclear weapons components and materials in 1998, no additional increase in 1999 through 2001.	Performed 160 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory. Significant decrease in nuclear weapons components and materials in 1999 and 2002, no additional increase in 1999 through 2002.
Dynamic Measurements	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%.	Performed 54 experiments. Increased nuclear materials inventory by 5%.	Performed 188 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999.	Performed 140 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999, and a 15% increase in 2000.	Performed 140 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory.	Performed 160 experiments. The nuclear materials inventory for 2002 was decreased by 10%.
Skyshine Measurements	Perform up to 1,050 criticality experiments per year.	Performed 54 experiments.	Performed 188 experiments.	Performed 140 experiments.	Performed 140 experiments.	Performed 160 experiments.
Vaporization	Perform up to 1,050 criticality experiments per year.	Performed 54 experiments.	Performed 188 experiments.	Performed 140 experiments.	Performed 140 experiments.	Performed 160 experiments.
Irradiation	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, interrogation techniques, and field systems. Increase nuclear materials inventory by 20%.	Performed 54 experiments. Increased nuclear materials inventory by 5%.	Performed 188 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999.	Performed 140 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999, and a 15% increase in 2000.	Performed 140 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory.	Performed 160 experiments. The nuclear materials inventory for 2002 was approximately the same as the 2001 inventory.

Table 2.4.2-1. Pajarito Site (TA-18)/Comparison of Operations (continued)

CAPABILITIES	SWEIS ROD[a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Nuclear Measurement School (relocated from CMR and renamed. At CMR it was called "Nonproliferation Training").	Not in SWEIS ROD (was located in CMR). IAEA schools are at CMR.				This capability was located at TA-18 in years past, but had been moved to CMR. In the effort to reduce the CMR Building to a Category 3 nuclear facility, these operations were moved back to TA-18, necessitating the transfer of additional nuclear material to the facility for use in the classes.	This capability returned to CMR and operated at CMR during 2002.

[a] Includes replacement of the portable linac.

2.4.3 Operations Data for the Pajarito Site

Research activities have remained well below those projected by the SWEIS ROD; consequently, operations data were also well below projections. The chief environmental measure of activities at the Pajarito Site is the estimated radiation dose to a hypothetical member of the public, referred to as the maximally exposed individual. The dose has remained below the SWEIS ROD projection. The dose estimated to result from 2002 activities was 1.0 millirem, compared to 28.5 millirem per year projected by the SWEIS ROD.

Chemical waste generation at Pajarito Site has been below the ROD projection from 1998 through 2002. Operational data are detailed in Table 2.4.3-1.

The chemical and low-level wastes generated in 2002 were shipped in 2003.

Table 2.4.3-1. Pajarito Site (TA-18)/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Radioactive Air Emissions Argon-41 [a]	Ci/yr	1.02E+2	1.8E-1 [a]	4.9E-1 [a]	8.0E-1 [a]	2.9E-1	1.6E-1
External Penetrating Radiation	mrem/yr	28.5 [b]	3	2.6	2.5	4.2	1.0
NPDES Discharge	MGY	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls
Wastes:							
Chemical	kg/yr	4,000	3,127	1,707	127	91	82
LLW	m^3/yr	145	4	31.3	14	13	0
MLLW	m^3/yr	1.5	0	7.9 [c]	0	0	0
TRU	m^3/yr	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0
Number of Workers	FTEs	95 [d] 70 [d]	65 [d]	70 [d]	73 [d]	73 [d]	78 [d]

[a] These values are not stack emissions. The SWEIS ROD projections are from Monte Carlo modeling. Values are from the first 394-foot (120-meter) radius. Other isotopes (nitrogen-13 and oxygen-15) are not shown because of very short half-lives.

[b] Page 5-116, Section 5.3.6.1, “Public Health,” of the SWEIS.

[c] The 7.9 cubic meters of MLLW in CY 2000 were generated as a result of maintenance activities.

[d] The first number shown in the “SWEIS ROD” column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the “SWEIS ROD” column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for CY 1998 through CY 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 1998 through 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

"Hummer"

2.4.4 Cerro Grande Fire Effects at the Pajarito Site

The Cerro Grande Fire damaged no facilities at TA-18. A Facility Recovery Plan was issued on May 22, 2000. The Facility Manager implemented this plan by establishing the Facility Recovery Team to perform safety reconnaissance and condition assessment of the facility. The assessment identified no deficiencies or significant environmental, safety, and health issues. Specifically, there was no need for additional oversight by managers or subject matter experts, no need for compensatory measures for facility systems, and no need for interim or unusual operations.

The fire destroyed much of the vegetation in and around TA-18. Because TA-18 is located in a canyon bottom, post-fire flooding became a major concern and a flood contingency plan was designed for protecting personnel, infrastructure, and nuclear material at risk. A plan for personnel safety was issued that included five flood condition warnings with varying responses, including facility evacuation (Condition 5). The infrastructure was protected by construction of earthern berms up-canyon northwest of CASA 1 and the SHEBA building and at the bridge crossing the stream channel to CASA 2 and CASA 3. Additional measures included clearing and deepening the stream channel running through the facility and installation of barriers, sandbags, and sheet piling at several locations to channel the flow of potential floods away from key structures. Some portable structures, such as metal sheds used to store radioactive sources, were moved to higher ground. Nuclear material at risk was protected by moving uranium solutions used for critical assembly fuel to storage locations on higher ground. Finally, a flood retention structure was built by the Army Corps of Engineers up Pajarito Canyon from the facility outside of Facility Management Unit 74 boundaries to protect the facility from floods. NEPA analysis for actions taken in response to the Cerro Grande Fire, including the installation of certain flood and sediment retention structures, was provided by a Special Environmental Analysis (DOE 2000c).

Flood retention structure during construction

2.5 Sigma Complex (TA-03)

The Sigma Complex Key Facility consists of four principal buildings: the Sigma Building (03-66), the Beryllium Technology Facility (03-141), the Press Building (03-35), and the Thorium Storage Building (03-159). Primary activities are the fabrication of metallic and ceramic items, characterization of materials, and process research and development. As shown in Table 2.5-1, this Key Facility had two Category 3 nuclear facilities, 03-66 and 03-159 identified in the SWEIS; however, in April 2000, Building 03-159 was downgraded from a hazard category 3 nuclear facility to a radiological facility and removed from the nuclear facilities list. In March 2001, Building 03-66 was downgraded from a hazard category 3 nuclear facility and removed from the nuclear facilities list (LANL 2002a). In September 2001, Buildings 03-35, 03-66, and 03-159 were placed on the radiological facility list (LANL 2002b). Building 03-141 is a Non-nuclear Moderate Hazard Facility.

Table 2.5-1. Sigma Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]
TA-03-0066	44 metric tons of depleted uranium storage	3	3	3			
TA-03-0159	thorium storage	3	3				

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
[c] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
[d] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
[e] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

2.5.1 Construction and Modifications at the Sigma Complex

Projected: The SWEIS projected significant facility changes for the Sigma Building itself and completion of the conversion of the Rolling Mill Building (TA-03-141) into the Beryllium Technology Facility. The five upgrades planned for the Sigma Building were

- replacement of graphite collection systems,
- modification of the industrial drain system,
- replacement of electrical components,
- roof replacement, and
- seismic upgrades.

In addition, the ROD projected completion of the development of the Beryllium Technology Facility (DOE 1993a).

Actual: Three of five planned upgrades of the Sigma Building are done, one is essentially done, and one remains undone. They are

- replacement of graphite collection systems–completed in 1998,
- modification of the industrial drain system–completed in 1999,
- replacement of electrical components–essentially completed in 2000; however, add-on assignments will continue,
- roof replacement–most of the roof was replaced in 1998 and 1999; however, additional work needs to be done, and
- seismic upgrades–not started.

Construction of the Beryllium Technology Facility, formerly known as the Rolling Mill Building, was completed during 1999. The Beryllium Technology Facility, a state-of-the-art beryllium processing facility, has 16,000 square feet of floor space, of which 13,000 are used for beryllium operations. The remaining 3,000 square feet will be used for general metallurgical activities. The mission of the new facility is to maintain and enhance the beryllium technology base that exists at LANL and to establish the capability for fabrication of beryllium powder components. Research will also be conducted at the Beryllium Technology Facility and will include energy- and weapons-related uses of beryllium metal and beryllium oxide. As discussed in Section 2.8, Machine Shops, beryllium equipment was moved from the shops into the Beryllium Technology Facility in stages during 2000 and 2001. The authorization to begin operations in the Beryllium Technology Facility was granted by DOE in January 2001.

Table 2.5.1-1 indicates the construction and modifications that have occurred at the Sigma Complex.

Sigma Building

Table 2.5.1-1. Sigma Complex Construction and Modifications

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Sigma Building Upgrades					
• Replacement of graphite collection systems	Completed in 1998.				
• Modification of the industrial drain system	Completed in 1998.				
• Replacement of electrical components	Worked on.	Worked on.	Completed.	Additional work being done.	Additional work being done.
• Roof replacement	Worked on; largely completed.				Additional work needed.
• Seismic upgrades	Not started.	Not started.	Not started.	Not started.	Not started.
Beryllium Technology Facility	Decontamination, decommissioning, and reconfiguration of Rolling Mill Building (DOE 1993a).	Reconfiguration completed.	Beryllium equipment moved in stages from Building 03-39.	DOE authorization to begin operations.	

2.5.2 Operations at the Sigma Complex

The SWEIS identified three capabilities for the Sigma Complex. No new capabilities have been added, and none has been deleted. As indicated in Table 2.5.2-1, activity levels for all capabilities during the 1998 to 2002 timeframe were less than levels projected by the SWEIS ROD.

2.5.3 Operations Data for the Sigma Complex

Levels of research and operations were less than those projected by the SWEIS ROD; consequently, operations data were also below projections. Waste volumes and NPDES discharge volumes were all lower than projected by the SWEIS ROD except for chemical waste generated in 2002. Table 2.5.3-1 provides details.

2.5.4 Cerro Grande Fire Effects at the Sigma Complex

Cerro Grande Fire effects on the Sigma Key Facility and its associated operations were minimal. Programs at Sigma did suffer downtime and loss of productivity during the evacuation, initial damage assessment, and recovery and reentry phases. No direct fire damage occurred and recovery was limited to cleaning or replacement of air system filters.

Table 2.5.2-1. Sigma Complex (TA-03)/Comparison of Operations

CAPABILITY	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Research and Development on Materials Fabrication, Coating, Joining, and Processing	Maintain and enhance capability to fabricate items from metals, ceramics, salts, beryllium, enriched uranium, depleted uranium, and other uranium isotope mixtures including casting, forming, machining, polishing, coating, and joining.	Capability maintained and enhanced, as projected.	Capability maintained and enhanced, as projected.	Capability maintained and enhanced, as projected.	Capability maintained and enhanced, as projected.	Capability maintained and enhanced, as projected.
Characterization of Materials	Maintain and enhance research and development activities on properties of ceramics, oxides, silicides, composites, and high-temperature materials. Characterize components for accelerator production of tritium.	Modest increase in research and development. Totals of 255 assignments and 1,200 specimens were characterized.	Modest increase in research and development. Totals of 248 assignments and 1,300 specimens were characterized.	Totals of 227 assignments and 1,070 specimens were characterized.	Totals of 184 assignments and 961 specimens were characterized.	Totals of 153 assignments and 759 specimens were characterized.
	Analyze up to 36 tritium reservoirs per year.	Total of 36 tritium reservoirs analyzed.	Less than 36 tritium reservoirs analyzed.	Total of 3 tritium reservoirs analyzed.	Activity transferred to TFF (See Table 2.7.2-1.) [b]	Activity transferred to TFF (See Table 2.7.2-1.) [b]
	Develop library of aged non-SNM materials from stockpiled weapons and develop techniques to test and predict changes. Store and characterize up to 2,500 non-SNM component samples, including uranium.	Less than 2,500 non-SNM component samples, including uranium, stored in library.	Approximately 500 non-SNM materials samples and 500 non-SNM component samples stored in library.	Approximately 1,000 non-SNM materials samples and 1,000 non-SNM component samples stored in library.	Approximately 500 non-SNM materials samples and 500 non-SNM component samples stored in library.	Approximately 500 non-SNM materials samples and 500 non-SNM component samples stored in library.
Fabrication of Metallic and Ceramic Items	Fabricate stainless steel and beryllium components for about 80 pits per year.	Fabricated two development pits from existing components.	No development pits fabricated.	No development pits fabricated.	No development pits fabricated.	No development pits fabricated.
	Fabricate up to 200 tritium reservoirs per year.	Total of 36 reservoirs fabricated.	Less than 200 reservoirs fabricated.	Less than 25 reservoirs fabricated.	Less than 25 reservoirs fabricated.	Less than 25 reservoirs fabricated.
	Fabricate components for up to 50 secondaries per year.	Evaluated less than 50 components. Fabricated 10 secondaries.	Fabricated components for less than 50 secondaries.	Fabricated components for less than 50 secondaries.	Fabricated components for less than 50 secondaries.	Fabricated components for less than 50 secondaries.
	Fabricate nonnuclear components for research and development: about 100 major hydrotests and 50 joint test assemblies per year.	Fabricated components for less than 100 major hydrotests and for less than 50 joint test assemblies.	Fabricated components for less than 100 major hydrotests and for less than 50 joint test assemblies.	Fabricated components for less than 100 major hydrotests and for less than 50 joint test assemblies.	Fabricated components for less than 100 major hydrotests and for less than 50 joint test assemblies.	Fabricated components for less than 100 major hydrotests and for less than 50 joint test assemblies.

Table 2.5.2-1. Sigma Complex (TA-03)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
	Fabricate beryllium targets.	None produced.	None produced.	None produced.	Provided material for the production of Inertial Confinement Fusion targets but did not fabricate any targets.	Provided material for the production of Inertial Confinement Fusion targets but did not fabricate any targets.
	Fabricate targets and other components for accelerator production of tritium research.	One radio-frequency cavity produced.	Three radio-frequency cavities were produced.	Seven radio-frequency cavities were polished. None were produced.	Two radio-frequency cavities were polished. None were produced.	Six radio-frequency cavities were polished. None were produced.
	Fabricate test storage containers for nuclear materials stabilization.	None produced.	None produced.	None produced.	Produced 50 containers.	Produced 50 containers.
	Fabricate nonnuclear (stainless steel and beryllium) components for up to 20 pit rebuilds per year.	None produced.	Fabricated nonnuclear (stainless steel and beryllium) components for up to 20 pit rebuilds per year.	Less than 10 stainless steel and no beryllium components produced.	Less than 10 stainless steel and no beryllium components produced.	Less than 10 stainless steel and no beryllium components produced.

[a] Includes Sigma Building renovation and modifications for Beryllium Technology Facility.
[b] The SWEIS indicated that this activity would also be accomplished at TFF.

Table 2.5.3-1. Sigma Complex (TA-03)/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 OPERATIONS
Radioactive Air Emissions: [a]							
Americium-241	Ci/yr	Not projected	9.30E-09	Not Detected	Not Measured [b]	Not Measured	Not Measured
Uranium-234	Ci/yr	6.60E-5	1.30E-09	1.2E-06	Not Measured [b]	Not Measured	Not Measured
Uranium-235	Ci/yr	Not projected	Not Detected	4.5E-08	Not Measured [b]	Not Measured	Not Measured
Uranium-238	Ci/yr	1.80E-3	6.20E-09	1.3E-08	Not Measured [b]	Not Measured	Not Measured
Thorium-230	Ci/yr	Not projected	Not Measured	6.4E-09	Not Measured [b]	Not Measured	Not Measured
NPDES Discharge:							
Total Discharges	MGY	7.3	12.7	5.77	3.9	0.05	2.0040
03A–022	MGY	4.4	12.7	5.77	3.9 [c]	0.05	2.0040
03A–024	MGY	2.9	No discharge	No discharge	0	0	0
Wastes:							
Chemical	kg/yr	10,000	22,489	3,208	3,672	1,265	32,397 [d]
LLW	m^3/yr	960	3	61	52	0.5	202
MLLW	m^3/yr	4	0	0.3	0	1.3	0
TRU	m^3/yr	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0
Number of Workers	FTEs	284 [e] 101 [e]	110 [e]	101 [e]	99 [e]	94 [e]	105 [e]

[a] During 1999, only emissions from TA-03-35 were measured using stack sampling. Potential emissions from other Sigma facilities were sufficiently small that measurement systems were not necessary to meet regulatory or facility requirements.

[b] Stack monitoring at Sigma was discontinued early in 2000. This decision was made because the potential emissions from the monitored stack were sufficiently low that stack monitoring was no longer warranted for compliance with U.S. Environmental Protection Agency (EPA) or DOE regulations. Therefore, no emissions from monitoring data are available.

[c] This outfall flowed all four quarters during CY 2000.

[d] A significant difference in the amount of chemical waste generated from that projected in the SWEIS is due to structure rehabilitation and disposal of equipment and other material debris resulting from bringing the Press Building back on-line.

[e] The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for CY 1998 through CY 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 1998 through 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.6 Materials Science Laboratory (TA-03)

The MSL Key Facility is a single laboratory building (3-1698) containing 27 labs, 60 offices, 21 materials research areas, and support rooms. The building, a two-story structure with approximately 55,000 square feet of floor space, was first opened in November 1993. Activities are all related to research and development of materials science. In 1998, 1999, and 2000, this Key Facility was categorized as a Low Hazard nonnuclear facility. In September 2001, MSL was placed on the Radiological Facility List (LANL 2001c) and remained on the list in 2002 (LANL 2002b).

2.6.1 Construction and Modifications at the Materials Science Laboratory

Projected: The SWEIS identified that completion of the top floor of the MSL was planned and was included in an environmental assessment (DOE 1991), but was not funded.

Actual: To date, the completion of the top floor of the MSL remains unscheduled and unfunded.

Table 2.6.1-1 indicates the construction and modifications that were planned and have not occurred at the MSL.

Table 2.6.1-1. MSL Construction and Modifications

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Completion of top floor of MSL	Unscheduled and not funded	Unscheduled and not funded	Unscheduled and not funded	Unscheduled and not funded	Unscheduled and not funded

2.6.2 Operations at the Materials Science Laboratory

The SWEIS identified four major types of experimentation at MSL: materials processing, mechanical behavior in extreme environments, advanced materials development, and materials characterization. No new capabilities have been added, and none has been deleted. In 2001, MSL conducted operations at levels approximating those projected by the SWEIS ROD.

During the 1998–2002 timeframe, the approximate total number of researchers and support staff at MSL has been fairly consistent with 105 in 1998 and 1999, 109 in 2000 and 2001, and 102 in 2002. These numbers are approximately 30 percent more than the 82 personnel projected by the SWEIS ROD.[5] (The primary measurement of activity for this facility is the number of scientists doing research.) This increase was accomplished by having researchers share offices and laboratories and reflects the high value placed on the MSL because of its quality lab space. Table 2.6.2-1 compares 1998 through 2002 operations to projections made by the SWEIS ROD.

[5] This number should not be confused with the FTE index shown in Table 2.6.3-1 (59 FTEs) as the two numbers represent different populations of individuals. The 109 total researchers represent students, temporary employees, and visiting staff from other institutions. The 59 FTEs represents only regular full-time and part-time LANL staff.

Table 2.6.2-1. MSL (TA-03)/Comparison of Operations

CAPABILITY	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Materials Processing	Maintain seven research capabilities at levels identified during preparation of the SWEIS: Wet chemistry • Thermomechanical processing • Microwave processing • Heavy equipment materials • Single crystal growth • Amorphous alloys • Powder processing Expand materials synthesis/processing to develop cold mock-up of weapons assembly and processing. Expand materials synthesis/processing to develop environmental and waste technologies.	Unlike projections, microwave processing was not performed, and materials synthesis/processing was not expanded. The other five capabilities were maintained as projected by the SWEIS ROD.	These capabilities were maintained as projected by the SWEIS ROD.	These capabilities were maintained as projected by the SWEIS ROD.	These capabilities were maintained as projected by the SWEIS ROD.	These capabilities were maintained as projected by the SWEIS ROD. Synthesis/processing of cold mock-up of weapons assembly and processing was expanded in 2002. Synthesis/processing of environmental and waste technologies was expanded in 2002.

Table 2.6.2-1. MSL (TA-03)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Mechanical Behavior in Extreme Environment	Maintain two research capabilities at levelsidentified during preparation of the SWEIS: • Mechanical testing • Fabrication and assembly Expand dynamic testing to include research and development for the aging of weapons materials. Develop a new research capability (machining technology).	Mechanical testing was maintained as projected, and dynamic testing was expanded as projected. Fabrication and assembly was not performed, however. A new research capability was developed for research into materials failure and fracture.	Mechanical testing was maintained as projected. Research into materials failure and fracture continued.	Mechanical testing was maintained as projected. Research into materials failure and fracture continued.	Items were maintained and processes improved. New capabilities development and process improvement is an ongoing effort.	These two capabilities were maintained as projected by the SWEIS ROD and additional capabilities were expanded as projected by the SWEIS ROD. Fabrication, assembly and prototype experiments were expanded in 2002. Dynamic testing for the aging of weapons materials was expanded in 2002. A new machining research capability was developed in 2002. It includes: • machining and mechanical fabrication; • physical energy measurements at cryogenic, low temperatures, high magnetic fields and high pressure; and • lab-scale fluid dynamics measurements.

Table 2.6.2-1. MSL (TA-03)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Advanced Materials Development	Maintain four research capabilities at levels identified during preparation of the SWEIS: • New materials • Synthesis and characterization • Ceramics • Superconductors	Three capabilities were maintained as projected by the SWEIS ROD. Synthesis and characterization was not performed, however.	This capability was maintained as projected by the SWEIS ROD.	This capability was maintained as projected by the SWEIS ROD.	This capability was maintained as projected by the SWEIS ROD.	This capability was maintained as projected by the SWEIS ROD. The Superconductors capability has been expanded to include: • Thin Film Deposition and • Electropolishing.
Materials Characterization	Maintain four research capabilities at levels identified during preparation of the SWEIS: • Surface science chemistry • X-ray • Optical metallography • Spectroscopy Expand corrosion characterization to develop surface modification technology. Expand electron microscopy to develop plasma source ion implantation.	As projected in the SWEIS ROD, four capabilities were maintained at 1995 levels, and corrosion characterization was expanded to develop surface modification technology. Electron microscopy was also expanded, but plasma source ion implantation was not developed.	Materials characterization continued to be maintained.	Materials characterization continued to be maintained.	These processes are expanded and improved upon on a continual basis.	These processes are expanded and improved upon on a continual basis. Optical metalography has been expanded to include ion analysis. Spectroscopy capabilities have been expanded to include the Ion Beam Materials Science Laboratory. Corrosion characterization has been expanded to develop surface modification technology. Electron microscopy has been expanded to develop plasma source ion implantation.

[a] Includes completion of the second floor of MSL.

2.6.3 Operations Data for the Materials Science Laboratory

The overall size of the MSL workforce has increased from about 57 workers in 1998 to about 61 in 2002 (regular part-time and full-time LANL employees listed in Table 2.6.3-1). Operational effects have been normal relative to SWEIS ROD projections. Generally, waste quantities have been lower than projected by the SWEIS ROD. An exception on chemical waste quantities occurred during 2000 when a lab in C-Wing was remodeled and construction and demolition debris (previously identified as industrial waste) was generated. Industrial solid waste (251 kilograms in 2001 not identified further) is nonhazardous, may be disposed in county landfills, and does not represent a threat to local environs. Radioactive air emissions continue to be negligible and therefore were not measured. Table 2.6.3-1 provides details.

Table 2.6.3-1. MSL (TA-03)/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Radioactive Air Emissions	Ci/yr	Negligible	Not measured	Not measured	Not measured	Not measured	Not measured
NPDES Discharge Volume	MGY	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls
Wastes:							
Chemical	kg/yr	600	244	154	881	255	149
LLW	m^3/yr	0	0	0	0	0	0
MLLW	m^3/yr	0	0	0	0	0	0
TRU	m^3/yr	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0
Number of Workers	FTEs	82 [a] 57 [a]	57 [a]	57 [a]	59 [a]	60 [a]	61 [a]

[a] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for CYs 2000, 2001, and 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for CYs 2000, 2001, and 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Materials Science Laboratory

2.6.4 Cerro Grande Fire Effects at the Materials Science Laboratory

Cerro Grande Fire effects on MSL and its associated operations were minimal. Programs at MSL suffered downtime and loss of productivity during the evacuation, initial damage assessment, and recovery and reentry phases. No direct damage occurred and recovery was limited to cleaning or replacement of air system filters.

2.7 Target Fabrication Facility (TA-35)

The TFF is a two-story building (35-213) housing activities related to weapons production and laser fusion research. This Key Facility is categorized as a Low Hazard nonnuclear facility. Exhaust air from process equipment is filtered prior to exhaust to the atmosphere. Sanitary wastes are piped to the LANL sewage facility at TA-46, and radioactive liquid wastes are piped to the treatment facility at TA-50.

2.7.1 Construction and Modifications at the Target Fabrication Facility

Projected: The ROD did not project any facility changes through 2005.

Actual: In 1998, process discharges from Outfall 04A-127 were rerouted to the sewage facility at TA-46, and the outfall was eliminated from the NPDES permit (DOE 1996f). There were no other significant facility additions or modifications from 1996 through 2002.

Table 2.7.1-1 indicates the construction and modifications at the TFF.

Table 2.7.1-1. TFF Construction and Modifications

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
No changes through 2005	Outfall 04A-127 eliminated with sewage rerouted to TA-46 (DOE 1996f).				

2.7.2 Operations at the Target Fabrication Facility

The SWEIS identified three capabilities for the TFF Key Facility. The primary measurement of activity for this facility is production of targets for research and testing (laser and physics testing). In the 1998–2002 timeframe, the number of targets and specialized components fabricated for testing purposes was consistently less than the 6,100 targets per year projected by the SWEIS ROD. As seen in the Table 2.7.2-1, other operations at the TFF were also below levels projected by the SWEIS ROD. The Characterization of Materials capability has been added to Table 2.7.2-1. This was a capability identified in the SWEIS for the TFF and Sigma Key Facilities but, before the 2001 Yearbook, was only listed for the Sigma Key Facility.

2.7.3 Operations Data for the Target Fabrication Facility

TFF activity levels are primarily determined by funding from fusion, energy, and other research-oriented programs, as well as funding from some defense-related programs. These programs, and hence operations at TFF, were at levels similar to those levels identified during preparation of the SWEIS and below levels projected by the SWEIS ROD. This summary is supported by the current workforce and by the 1998–2002 waste volumes, which were less than projected. Table 2.7.3-1 details operations data for 1998–2002.

Table 2.7.2-1. TFF (TA-35)/Comparison of Operations

CAPABILITY	SWEIS ROD	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Precision Machining and Target Fabrication	Provide targets and specialized components for ~6,100 laser and physics tests per year, including a 20% increase over levels identified during preparation of the SWEIS for high-explosive pulsed-power target operations, and including ~100 high-energy-density physics tests.	Provided targets and specialized components for ~1,200 tests. Supported high-explosive pulsed-power tests at 1995 levels. Supported ~25 high-energy-density physics tests.	Provided targets and specialized components for ~1,200 tests. Supported high-explosive pulsed-power tests at 1995 levels. Supported ~25 high-energy-density physics tests.	Provided targets and specialized components for ~1,300 tests. Supported high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; supported ~seven high-energy-density physics tests.	Provided targets and specialized components for ~1,600 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical high-energy-density hydrodynamics. Supported ~seven high-energy-density physics tests.	Provided targets and specialized components for ~1,600 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical high-energy-density hydrodynamics. Supported ~18 high-energy-density physics tests.
Polymer Synthesis	Produce polymers for targets and specialized components for ~6,100 laser and physics tests per year, including a 20% increase over levels identified during preparation of the SWEIS for high-explosive pulsed-power target operations, and including ~100 high-energy-density physics tests.	Produced polymers for targets and specialized components for ~600 tests. Supported high-explosive pulsed-power tests at 1995 levels. Supported ~15 high-energy-density physics tests.	Produced polymers for targets and specialized components for ~600 tests. Supported high-explosive pulsed-power tests at 1995 levels. Supported ~20 high-energy-density physics tests.	Produced polymers for targets and specialized components for ~600 tests. Supported high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; supported ~seven high-energy-density physics tests.	Produced polymers for targets and specialized components for ~800 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical high-energy-density hydrodynamics. Supported ~seven high-energy-density physics tests.	Produced polymers for targets and specialized components for ~800 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical high-energy-density hydrodynamics. Supported ~18 high-energy-density physics tests.

Table 2.7.2-1. TFF (TA-35)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Chemical and Physical Vapor Deposition	Coat targets and specialized components for ~6,100 laser and physics tests per year, including a 20% increase over levels identified during preparation of the SWEIS for high-explosive pulsed-power target operations, including ~100 high-energy-density physics tests, and including support for pit rebuild operations at twice the levels identified during preparation of the SWEIS.	Coated targets and specialized components for ~600 tests. Supported high-explosive pulsed-power tests at 1995 levels. Supported ~25 high-energy-density physics tests. Provided no support for pit rebuild operations.	Coated targets and specialized components for ~600 tests. Supported high-explosive pulsed-power tests at 1995 levels. Supported ~25 high-energy-density physics tests. Provided coatings for pit rebuild operations.	Coated targets and specialized components for ~600 tests. Supported high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; supported ~seven high-energy-density physics tests. Provided coatings for pit rebuild operations.	Coated targets and specialized components for ~800 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical high-energy-density hydrodynamics. Supported ~seven high-energy-density physics tests. Provided coatings for pit rebuild operations.	Coated targets and specialized components for ~800 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical high-energy-density hydrodynamics. Supported ~18 high-energy-density physics tests. Provided coatings for pit rebuild operations.
Characterization of Materials [a]	Analyze up to 36 tritium reservoirs per year. [a]				Less than 36 tritium reservoirs analyzed.	Less than 36 tritium reservoirs analyzed.

[a] The SWEIS indicated that this activity would be accomplished at TFF as well as the Sigma Complex. See Table 2.5.2-1.

Table 2.7.3-1. TFF (TA-35)/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Radiological Air Emissions	Ci/yr	Negligible	Not measured	Not measured [a]	Not measured [b]	Not measured [b]	Not measured [b]
NPDES Discharge:							
4A-127	MGY	0	Eliminated [c]	Eliminated	Eliminated	Eliminated	Eliminated
Wastes:							
Chemical	kg/yr	3,800	2,827	594	1,062	668	904
LLW	m^3/yr	10	0	0	0	0.2	0.4
MLLW	m^3/yr	0.4	0	0	0	0	0
TRU	m^3/yr	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0
Number of Workers	FTEs	98 [d] 54 [d]	57 [d]	54 [d]	52 [d]	54 [d]	53 [d]

[a] Potential emissions during 1999 were sufficiently small that measurement systems were not necessary to meet regulatory or facility requirements.

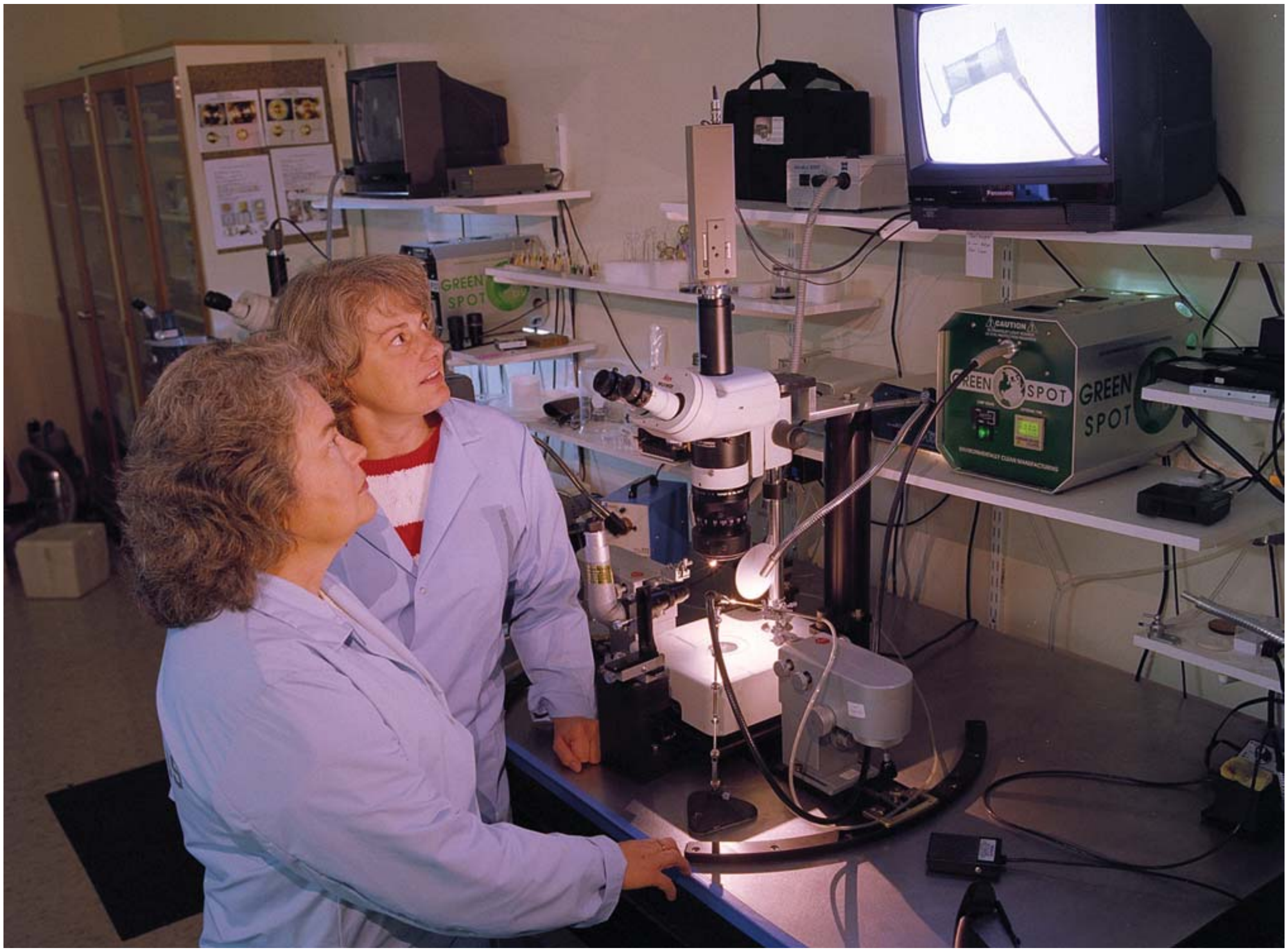
[b] The emissions continue to be sufficiently low that monitoring is not required.

[c] Outfall eliminated before 1999: 04A-127 (TA-35).

[d] The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for CY 1998 through CY 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 1998 through 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.7.4 Cerro Grande Fire Effects at the Target Fabrication Facility

Programs at TFF suffered substantial downtime and loss of productivity during the evacuation and initial damage assessment, recovery, and reentry phases. Lost time because of the fire resulted in the TFF being available only about 93 percent of the planned operational days in 2000 while the target assembly area was only available about 88 percent. No direct fire damage occurred; however, some equipment was damaged because of fluctuating power and loss of liquid nitrogen cooling. Additionally, smoke damage to work areas and air handling systems was sufficient to prevent use of the Target Assembly area. The Target Assembly Team relocated to Sandia National Laboratories for a two-week period while their work areas and air handling systems were cleaned and repaired.



Inspection of target component

2.8 Machine Shops (TA-03)

The Machine Shops Key Facility consists of two buildings, the Nonhazardous Materials Machine Shop (Building 03-39) and the Radiological Hazardous Materials Machine Shop (Building 03-102). Both buildings are located within the same exclusion area. Activities consist of machining, welding, and assembly of various materials in support of major LANL programs and projects, principally those related to weapons manufacturing. In September 2001, Building 03-102 was placed on the Radiological Facility List (LANL 2001c) and remained on the radiological facility list in 2002 (LANL 2002b).

2.8.1 Construction and Modifications at the Machine Shops

Projected: The SWEIS ROD projected no new construction or major modifications to the shops

Actual: There were two facility modifications over the three-year period 1996–1998 at Building 03-39. In the center wing of Building 03-39, Room 26 was put to use as the central weapons information center for the Information and Records Management Group of the Computing, Information, and Communications Division. Room 26 had been empty (DOE 1996g). Additionally, the waste machine coolant generated by the Building 03-39 shops was reduced in 1998 (LANL 1998d). In 1999, Building 03-39 was re-roofed by installing a single-ply membrane over the existing roof. In 2001, both Buildings 03-39 and -102 upgraded security containers to meet life safety code standards. Building 03-102 upgraded both the ventilation and electrical systems in 1998. In 2002, the Building 03-66 thermal treatment of depleted uranium parts was duplicated at Building 03-102.

Consistent with SWEIS ROD projections, there were no new construction or major modifications to the shops in 1999, 2000, 2001, or 2002. Beryllium operations conducted in Room 16 in the north wing of Building 03-39 were completely moved to Building 03-141, the Beryllium Technology Facility (part of the Sigma Key Facility). This move was started in 2000 and was, for the most part, completed in 2001. Remaining equipment and materials will be relocated prior to decontamination and decommissioning. Table 2.8.1-1 indicates the construction and modifications at the Machine Shops.

Table 2.8.1-1. Machine Shops Construction and Modifications

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
No new construction or modifications projected	Building 03-39, Room 26 became central weapons information center (DOE 1996g).				
	Upgraded and replaced ventilation system in Building 03-102 (LANL 1996a).				
	Waste machine coolant volume reduction at Building 03-39 (LANL 1998d).				
		Re-roofed Building 03-39 (LANL 1998b).			
		Electrical upgrades at Building 03-102 (LANL 1998c).			
			Beryllium equipment moved to Beryllium Tech. Facility from Building 03-39.	Beryllium equipment moved to Beryllium Tech. Facility from Building 03-39.	
				Security container fire and lighting upgrades at Buildings 03-39 and 03-102 (LANL 2001o).	
					Duplicate TA-03-66 heat treating capability at Building 03-102 (LANL 2002h).

2.8.2 Operations at the Machine Shops

As shown in Table 2.8.2-1, the SWEIS identified three capabilities at the shops. These same three capabilities continue to be maintained. No new capabilities have been added to this Key Facility. All activities during the 1998–2002 timeframe occurred at levels well below those projected by the SWEIS ROD. The workload at the Shops is directly linked to research and development and production requirements.

2.8.3 Operations Data for the Machine Shops

Since activities were well below projections by the SWEIS ROD, so too were operations data. The highest chemical waste generation was 26,474 kilograms generated in 2001, compared to a ROD projection of 474,000 kilograms per year. Table 2.8.3-1 provides details.

2.8.4 Cerro Grande Fire Effects at the Machine Shops

Cerro Grande Fire effects on the Machine Shops and associated operations were minimal. Programs at the Machine Shops suffered downtime and loss of productivity during the evacuation, initial damage assessment, and recovery and reentry phases.

Machine Shop operations

Table 2.8.2-1. Machine Shops (TA-03)/Comparison of Operations

CAPABILITY	SWEIS ROD	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Fabrication of Specialty Components	Provide fabrication support for the dynamic experiments program and explosives research studies. Support up to 100 hydrodynamic tests/yr. Manufacture up to 50 joint test assembly sets/yr. Provide general laboratory fabrication support as requested.	Specialty components were fabricated at levels below those projected by the SWEIS ROD.	Specialty components were fabricated at levels below those projected by the SWEIS ROD.	Specialty components were fabricated at levels below those projected by the SWEIS ROD.	Specialty components were fabricated at levels below those projected by the SWEIS ROD.	Specialty components were fabricated at levels below those projected by the SWEIS ROD.
Fabrication Utilizing Unique Materials	Continue fabrication utilizing unique and unusual materials.	Fabrication with unique materials was conducted at levels below those projected by the SWEIS ROD.	Fabrication with unique materials was conducted at levels below those projected by the SWEIS ROD.	Fabrication with unique materials was conducted at levels below those projected by the SWEIS ROD.	Fabrication with unique materials was conducted at levels below those projected by the SWEIS ROD.	Fabrication with unique materials was conducted at levels below those projected by the SWEIS ROD.
Dimensional Inspection of Fabricated Components	Provide appropriate dimensional inspection of above fabrication activities. Undertake additional types of measurements and inspections.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.

Table 2.8.3-1. Machine Shops (TA-03)/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Radioactive Air Emissions:							
Plutonium-238	Ci/yr	Not projected [a]	2.0E-10 [a]	Not detected	Not detected	Not detected	Not detected
Plutonium-239	Ci/yr	Not projected [a]	Not detected	Not detected	Not detected	Not detected	3.9E-10 [b]
Thorium-228	Ci/yr	Not projected [a]	2.3E-9 [a]	2.5E-9 [b]	Not detected	Not detected	8.0E-10 [b]
Thorium-230	Ci/yr	Not projected [a]	6.8E-9 [a]	7.8E-10 [b]	1.2E-9 [b]	Not detected	Not detected
Thorium-232	Ci/yr	Not projected [a]	1.4E-9 [a]	5.4E-10 [b]	Not detected	Not detected	Not detected
Uranium-234	Ci/yr	Not projected [a]	1.7E-5 [a]	3.0E-7 [b]	5.3E-8 [b]	2.1E-8 [b]	8.7E-8 [b]
Uranium-235	Ci/yr	Not projected [a]	5.8E-9 [a]	1.2E-8 [b]	1.9E-9 [b]	9.9E-10 [b]	3.8E-9 [b]
Uranium-238	Ci/yr	1.50E-4	3.6E-8	1.3E-8	1.3E-9	4.5E-10	5.0E-9
NPDES Discharge	MGY	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls
Wastes:							
Chemical	kg/yr	474,000	4,399	3,955	887	26,474	2,023
LLW	m^3/yr	606	27	40.4	409	22	44
MLLW	m^3/yr	0	0.1	0.03	0.12	0.05	0
TRU	m^3/yr	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0
Number of Workers	FTEs	289 [c] 81[c]	83 [c]	81 [c]	80 [c]	91 [c]	92 [c]

[a] The SWEIS ROD did not contain projections for these radioisotopes.

[b] This radionuclide was not projected by the SWEIS ROD because it was either dosimetrically insignificant or not isotopically identified.

[c] The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for CY 1998 through CY 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 1998 through 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.9 High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, TA-37)

The High Explosives Processing Key Facility is located in all or parts of seven technical areas. Building types consist of production and assembly facilities, analytical laboratories, explosives storage magazines, and a facility for treatment of high explosive contaminated wastewaters. Activities consist primarily of manufacture and assembly of high explosives components for nuclear weapons and for Science-Based Stockpile Stewardship Program tests and experiments. Environmental and safety tests are performed at TA-11 and TA-09 while TA-08 houses radiography activities.

As identified in the SWEIS, this Key Facility has one Category 2 nuclear building in TA-08 (8-23) (Table 2.9-1). The High Explosives Processing facilities identified as radiological are shown in Table 2.9-2.

Table 2.9-1. High Explosives Processing Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]
TA-08-0022	Radiography facility	2	2	2			
TA-08-0023	Radiography facility	2	2	2	2	2	2
TA-08-0024	Isotope Building	2					
TA-08-0070	Experimental Science	2					
TA-16-0411	Intermediate Device Assembly		2	2			

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
[c] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
[d] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
[e] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

Table 2.9-2. High Explosives Processing Buildings Identified as Radiological Facilities

BUILDING	DESCRIPTION	LANL 2001 [a]	LANL 2002 [b]
TA-08-0022	Radiography	Rad	Rad
TA-08-0070	Nondestructive Testing and Evaluation	Rad	Rad
TA-08-0120	Radiography		Rad
TA-11-0030	Vibration Testing	Rad	Rad
TA-16-0088	Component Storage	Rad	Rad
TA-16-0202	Laboratory		Rad
TA-16-0207	Component Testing		Rad
TA-16-0300	Component Storage	Rad	Rad
TA-16-0301	Component Storage	Rad	Rad
TA-16-0302	Component Storage/Training	Rad	Rad
TA-16-0332	Component Storage	Rad	Rad
TA-16-0410	Assembly Building	Rad	Rad
TA-16-0411	Assembly Building	Rad	Rad
TA-16-0413	Component Storage	Rad	
TA-16-0415	Component Storage	Rad	
TA-37-0010	Storage Magazine	Rad	Rad
TA-37-0014	Storage Magazine	Rad	Rad
TA-37-0016	Storage Magazine		Rad
TA-37-0022	Magazine	Rad	
TA-37-0024	Storage Magazine	Rad	Rad
TA-37-0025	Storage Magazine	Rad	Rad

[a] LANL Radiological Facility List (LANL 2001c).
[b] LANL Radiological Facility List (LANL 2002b).

Operations at this Key Facility are performed by two separate Divisions: the Dynamic Experimentation (DX) Division and the Engineering Sciences and Applications (ESA) Division. ESA performs the majority of the high explosives manufacturing and assembly work while DX assesses the parts produced by ESA.

The ESA Weapon Materials and Manufacturing group brings 99 percent of the explosives into LANL and stores it as raw material. ESA presses the raw explosives into solid shapes and machines these shapes to specifications. The completed shapes are shipped to DX for testing (detonation). The DX High Explosives Science and Technology group also creates a small quantity of high explosives during the year from basic chemistry. The DX Detonation Science and Technology group uses a small amount of the raw explosives for making detonators.

There are two major pathways for expending the explosives brought into LANL: wastes from the pressing and machining operations, which are burned, and completed shapes that are detonated as part of the testing program.

As a result, information from both Divisions must be combined to completely capture operational parameters for production of high explosives. To assist the reader, this information is presented both in separate and combined forms.

2.9.1 Construction and Modifications at High Explosives Processing

Projected: The ROD projected four facility modifications for this Key Facility. These four modifications were

- construction of the High Explosive Waste Treatment Facility (HEWTF),
- modification of 17 outfalls and their elimination from the NPDES permit,
- relocation of the Weapons Components Testing Facility, and
- the TA-16 steam plant conversion.

Actual: All four projects identified in the ROD were completed before 1999. The real-time, small-component radiography capability installed in Building TA-16-260 was completed and made fully operational in 2001. When this capability became fully operational in 2001, Buildings TA-16-220, -222, -223, -224, -225, and -226 were vacated and are presently being demolished (DOE 1997a).

Planning and modification work at TA-09 started in 1998 and has continued to allow consolidation of high explosives formulation operations previously conducted at TA-16-340 with other TA-09 high explosives operations (DOE 1999b).

Table 2.9.1-1 summarizes the construction and modification activities at the High Explosive Processing Key Facility. The additional construction and modifications described in the table address other aspects of consolidating the ongoing work and improving environmental stewardship.

High Explosives Burning Facility

Table 2.9.1-1. High Explosive Processing Construction and Modifications

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK [a]	2001 YEARBOOK	2002 YEARBOOK
Construction of the HEWTF	HEWTF, TA-16-1508, for treating process waters via sand filtration became fully operational in 1997.	Completed before 1999.			
Modification of 17 outfalls and their elimination from the NPDES permit	Nineteen outfalls were eliminated from the NPDES permit during 1997 and 1998. [b]	Completed before 1999.			
Relocation of the Weapons Components Testing Facility	Completed before 1999.	Completed before 1999.			
TA-16 steam plant conversion	Energy-efficient satellite steam boilers placed into service for each major TA-16 building or cluster of buildings in 1997. Gas-fired, central steam plant for TA-16 shut down.	Completed before 1999.			
	Real-time, small-component radiography capability installed in TA-16-260 in 1998 (DOE 1997a).	TA-16-260 not fully operational in 1999 (DOE 1997a).	TA-16-260 not fully operational in 2000 (DOE 1997a).	TA-16-260 completed and made fully operational in 2001. Buildings 16-220, -222, -223, -224, -225, and -226 vacated.	Decontamination and decommissioning of Buildings 16-220, -222, -223, -224, -225, and -226.
	High explosives casting and inert (mock high explosives) processing operations moved from Buildings TA-16-300 and -302 to Building TA-16-260. TA-16-300 and -302 became Joint Weapons Training Facility (DOE 1996h).				
	Old casting and storage buildings TA-16-164 and -27 and six nearby WWII-vintage machining and inspection buildings plus associated support structures removed under decontamination and decommissioning (DOE 1997b).				

Table 2.9.1-1. High Explosive Processing Construction and Modifications (continued)

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK [a]	2001 YEARBOOK	2002 YEARBOOK
	Planning and modification work at TA-09 to consolidate high explosive formulation operations previously conducted at TA-16-340 with other TA-09 HE operations (DOE 1999b).	Planning and modification work at TA-09 to consolidate high explosive formulation operations continued (DOE 1999b).	Planning and modification work at TA-09 to consolidate high explosive formulation operations continued (DOE 1999b). Building TA-16-340 closed during second quarter of FY 2000.	Planning and modification work at TA-09 to consolidate high explosive formulation operations continued (DOE 1999b).	
	Explosive material storage magazines at TA-28 used for PTLA support rather than high explosive processing operations.	Explosives stored at TA-28 were moved to TA-37 for storage. TA-28 remains part of High Explosive Processing Key Facility.			
	Burn operations at high-explosive-contaminated combustible trash incinerator, TA-16-1409 ceased. Draft closure plan submitted to New Mexico State.		Incinerator underwent Resource Conservation and Recovery Act (RCRA) clean-closure and was dismantled and scrapped.		
		Aboveground wastewater storage tank system placed into service at TA-09 (LANL 1998e).			
			RCRA closure activities continued for TA-16-387 flash pad [c] (ESA; LANL 1996b).		
			RCRA closure activities continued for TA-16-394 burn tray [d] (ESA; LANL 2000b).		
			ESA upgraded a burn unit improving capacity and efficiency and minimizing environmental impacts.		

Table 2.9.1-1. High Explosive Processing Construction and Modifications (continued)

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK [a]	2001 YEARBOOK	2002 YEARBOOK
			Cerro Grande Fire impacts: All V Site buildings except one destroyed, fire and smoke damage, underground fire in Material Disposal Area (MDA) R.		
					Consolidation of all high explosive burning operations at TA-16-388 and -399.

[a] Additional information on the impacts from the Cerro Grande Fire can be found in Section 2.9.4.
[b] Refer to Table 2.9.3-1 for information on the outfalls that were eliminated.
[c] Approximately 545 cubic meters of hazardous wastes were removed during closure of the flash pad.
[d] Approximately 114 cubic meters of hazardous wastes were removed during closure of the burn tray.

2.9.2 Operations at High Explosives Processing

The SWEIS ROD identified six capabilities for this Key Facility. No new capabilities have been added, and none has been deleted. Activity levels during 2002 continued below those projected by the SWEIS ROD. These projections were based on the possibility that LANL would take over high explosives production work being performed at Pantex Plant. DOE decided, however, to keep high explosives production at the Pantex Plant. However, the projections for high explosive processing were retained because DOE intends to keep LANL available as a back-up capability for the Pantex Plant.

As seen in Table 2.9.2-1, high explosives and plastics development and characterization operations remained below levels projected in the SWEIS. Efforts continued in 2002 to develop protocols for obtaining returned stockpile materials, develop new test methods, and procure new equipment to support requirements for science-based studies on stockpile materials.

In 2002, 9,402 pounds of high explosives and 1,531 pounds of high explosives simulant material from DX and ESA Divisions were used in the fabrication of test components. The level of high explosives usage was significantly below the ROD projection of 82,700 pounds of high explosives, while the usage of high explosives simulant was about the same as the projection of 2,910 pounds. However, the high explosive simulant results in chemical waste that is shipped offsite for disposal and does not result in environmental impacts at LANL.

In 2002, 3,170 pounds of explosive scrap were burned at the TA-16 Burn Ground. In addition, 636 pounds of explosive-contaminated combustible solid wastes were burned, 149 gallons of explosive-contaminated solvent-water solutions were burned, 4,305 pounds of explosive-contaminated metal were treated and salvaged, and 27,500 gallons of explosive-contaminated water were treated and released.

These levels were well below those projected by the SWEIS ROD. Three outfalls from High Explosives Processing remain on the NPDES permit: 03A-130, 05A-055 (the HEWTF), and 05A-097.

2.9.3 Operations Data for High Explosives Processing

The details of operations data from 1998 through 2002 are provided in Table 2.9.3-1. The NPDES discharge volume for 2002 was about 30,000 gallons, compared to a projection of more than 12 million gallons. Except for chemical wastes, waste quantities have consistently been well below projections made by the SWEIS ROD. The chemical waste projection of 13,000 kilograms was exceeded in 2000 through 2002.

2.9.4 Cerro Grande Fire Effects at High Explosives Processing

On May 7, 2000, the High Explosives Processing Key Facility Emergency Control Center was activated, TA-16 (S-Site) was evacuated, and all buildings were placed into a safe closed condition. Personnel began bulldozing a fire line around WETF. By May 12, 2000, TA-16 was on fire. On May 14, several emergency entries were made to assure that WETF was adequately maintained to keep its authorization basis active.

By May 15, management started planning for reentry, and procedures were established. On May 17, TA-16 was reentered according to procedures, and personnel started to assess buildings and perform cleanup following the fire. Care had to be taken to avoid hotspots (small fires burning in tree roots, stumps, etc.) that were a real danger to personnel walking across the land. By May 19, over 298 structures had been assessed for damage, and office buildings were reopened so people could return to work. On May 21, Management authorized employees to return to work at TA-16.

Table 2.9.2-1. High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, and TA-37)/Comparison of Operations

CAPABILITY	SWEIS ROD[a, b]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
High Explosives Synthesis and Production	Continue synthesis research and development, produce new materials, and formulate explosives as needed. Increase production of materials for evaluation and process development. Produce material and components for directed stockpile production.	The high explosives synthesis and production operations were less than those projected by the SWEIS ROD.	The high explosives synthesis and production operations were less than those projected by the SWEIS ROD.	The high explosives synthesis and production operations were less than those projected by the SWEIS ROD.	The high explosives synthesis and production operations were less than those projected by the SWEIS ROD.	The high explosives synthesis and production operations were less than those projected by the SWEIS ROD.
High Explosives and Plastics Development and Characterization	Evaluate stockpile returns. Increase (40%) efforts in development and characterization of new plastics and high explosives for stockpile improvement. Improve predictive capabilities. Research high explosives waste treatment methods.	High explosives formulation, synthesis, production, and characterization operations were performed at levels that were less than those projected by the SWEIS ROD.	High explosives formulation, synthesis, production, and characterization operations were performed at levels that were less than those projected by the SWEIS ROD.	High explosives formulation, synthesis, production, and characterization operations were performed at levels that were less than those projected by the SWEIS ROD.	High explosives formulation, synthesis, production, and characterization operations were performed at levels that were less than those projected by the SWEIS ROD.	High explosives formulation, synthesis, production, and characterization operations were performed at levels that were less than those projected by the SWEIS ROD.
High Explosives and Plastics Fabrication	Continue traditional stockpile surveillance and process development. Supply parts to Pantex for surveillance, stockpile rebuilds, and joint test assemblies. Increase fabrication for hydrodynamic and environmental testing.	Fabricated ~950 high explosives parts in support of the weapons program, including high explosives characterization studies, subcritical experiments, hydro tests, surveillance activities, environmental weapons tests, and safety tests.	DX Division fabricated ~3,000 high explosive parts, and ESA Division fabricated ~870 high explosives parts in 1999. Therefore, ~3,870 parts were fabricated in support of the weapons program, including high explosives characterization studies, subcritical experiments, hydrotests, surveillance activities, environmental weapons tests, and safety tests.	DX Division fabricated ~2,000 high explosive parts, and ESA Division fabricated ~578 high explosives parts in 2000. Therefore, ~2,578 parts were fabricated in support of the weapons program, including high explosives characterization studies, subcritical experiments, hydrotests, surveillance activities, environmental weapons tests, and safety tests.	DX Division fabricated ~2,000 high explosive parts, and ESA Division fabricated ~578 high explosives parts in 2001. Therefore, ~2,578 parts were fabricated in support of the weapons program, including high explosives characterization studies, subcritical experiments, hydrotests, surveillance activities, environmental weapons tests, and safety tests.	DX Division fabricated ~2,000 high explosive parts, and ESA Division fabricated ~778 high explosives parts in 2002. Therefore, ~2,778 parts were fabricated in support of the weapons program, including high explosives characterization studies, subcritical experiments, hydrotests, surveillance activities, environmental weapons tests, and safety tests.

Table 2.9.2-1. High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, and TA-37)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a, b]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Test Device Assembly	Increase test device assembly to support stockpile related hydrodynamic tests, joint test assemblies, environmental and safety tests, and increased research and development. Approximately 100 major assemblies per year.	Eleven major assemblies were provided for hydrodynamic, Nevada Test Site subcritical, and joint environmental test programs.	ESA Division provided 10 major assemblies for hydrodynamic, Nevada Test Site subcritical, and joint environmental test programs.	ESA Division provided 10 major assemblies for hydrodynamic, Nevada Test Site subcritical, and joint environmental test programs.	ESA Division provided less than 100 major assemblies for Nevada Test Site subcritical and joint environmental test programs.	ESA Division provided less than 100 major assemblies for Nevada Test Site subcritical and joint environmental test programs.
Safety and Mechanical Testing	Increase (50%) safety and environmental tests related to stockpile assurance. Improve predictive models. Approximately 15 safety and mechanical tests per year.	Fifteen stockpile related safety and mechanical tests during 1998.	DX Division performed 13 stockpile related safety and mechanical tests during 1999. ESA Division provided three revalidation and two certification assemblies during 1999.	DX Division performed 13 stockpile related safety and mechanical tests during 2000. ESA Division provided three revalidation and two certification assemblies during 2000.	DX Division performed less than 15 stockpile related safety and mechanical tests during 2001.	DX Division performed less than 15 stockpile related safety and mechanical tests during 2002.
Research, Development, and Fabrication of High-Power Detonators	Increase operations to support assigned stockpile stewardship management activities; manufacture up to 40 major product lines per year. Support DOE complex for packaging and transportation of electro-explosive devices.	High-power detonator activities resulted in the manufacture of less than 10 product lines in 1998.	High-power detonator activities by DX Division resulted in the manufacture of less than 20 product lines in 1999. In addition, ESA Division provided fourteen flux generator assemblies in 1999.	High-power detonator activities by DX Division resulted in the manufacture of less than 20 product lines in 2000. In addition, ESA Division provided 14 flux generator assemblies in 2000.	High-power detonator activities by DX Division resulted in the manufacture of less than 40 product lines in 2001.	High-power detonator activities by DX Division resulted in the manufacture of less than 40 product lines in 2002.

[a] The total amount of explosives and mock explosives used across all activities is an indicator of overall activity levels for this Key Facility. Amounts projected by the SWEIS ROD are 82,700 pounds of explosives and 2,910 pounds of mock explosives. Actual amounts used in 2002 were 9,402 pounds of high explosive and 1,531 pounds of mock high explosive.

[b] Includes construction of the HEWTF, the steam plant conversion, relocation of the Weapons Testing Facility, and outfall modifications.

Table 2.9.3-1. High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, and TA-37)/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Radioactive Air Emissions:							
Uranium-238	Ci/yr	9.96E-7	[a]	[a]	[a]	[a]	[a]
Uranium-235	Ci/yr	1.89E-8	[a]	[a]	[a]	[a]	[a]
Uranium-234	Ci/yr	3.71E-7	[a]	[a]	[a]	[a]	[a]
NPDES Discharge: [b]							
Number of outfalls	---	22	4	3	3	3	3
Total Discharges	MGY	12.4	17.1	0.118	0.086	0.036	0.03
02A-007 (TA-16)	MGY	7.4	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
03A-130 (TA-11) [c]	MGY	0.04	0.1	0.022	0.001	0.002	0.002
04A-070 (TA-16)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
04A-083 (TA-16)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
04A-092 (TA-16)	MGY	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
04A-115 (TA-08)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
04A-157 (TA-16)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
05A-053 (TA-16)	MGY	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
05A-054 (TA-16) [d]	MGY	3.6	6.3	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
05A-055 (TA-16)	MGY	0.13	8.9	0.096	0.085	0.034	0.0275
05A-056 (TA-16)	MGY	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
05A-066 (TA-09)	MGY	0.74	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
05A-067 (TA-09)	MGY	0.33	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
05A-068 (TA-09)	MGY	0.06	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
05A-069 (TA-11)	MGY	0.01	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
05A-071 (TA-16)	MGY	0.04	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
05A-072 (TA-16)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
05A-096 (TA-11)	MGY	0.01	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
05A-097 (TA-11)	MGY	0.01	1.8	No discharge	No discharge	No discharge	0.00
06A-073 (TA-16)	MGY	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
06A-074 (TA-08)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
06A-075 (TA-08)	MGY	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
Wastes:							
Chemical [e]	kg/yr	13,000	12,237	13,329	1,032,985[f]	375,283 [g]	15,109 [h]
LLW	m^3/yr	16	6	8.3	3	1	8.69
MLLW	m^3/yr	0.2	0	0	0	0	0
TRU	m^3/yr	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0
Number of Workers	FTEs	335 [i] 96 [i]	201 [i]	96 [i]	92 [i]	107 [i]	114 [i]

[a] No stacks require monitoring; all non-point sources are measured using ambient monitoring.

Table 2.9.3-1. High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, and TA-37)/Operations Data (continued)

[b] Outfalls eliminated before 1999: 02A-007 (TA-16), 04A-070 (TA-16), 04A-083 (TA-16), 04A-092 (TA-16), 04A-115 (TA-08), 04A-157 (TA-16), 05A-053 (TA-16), 05A-056 (TA-16), 05A-066 (TA-09), 05A-067 (TA-09), 05A-068 (TA-09), 05A-069 (TA-11), 05A-071 (TA-16), 05A-072 (TA-16), 05A-096 (TA-11), 06A-073 (TA-16), 06A-074 (TA-08), and 06A-075 (TA-08).

[c] This outfall discharged only one quarter during calendar year 1999.

[d] Outfall 05A-054 had discharges only part of the year. Process flows were routed to the HEWTF, and this outfall was then eliminated from the NPDES permit.

[e] Explanations for the chemical waste numbers that exceed the ROD projections were not given in the 1998 and 1999 Yearbooks. Research indicates that the CY 1998 volume consists of 12,236 kilograms of non-ER chemical waste and 36,364 kilograms of ER waste. The CY 2002 volume includes 2,721.55 kilograms of roll-off scrap metal for recycle that was caught up in the DOE radiological area release moratorium.

[f] During CY 2000, cleanup of MDA R generated 1,023,284 kilograms of chemical waste.

[g] During CY 2001, cleanup of MDA R generated 370,124 kilograms of chemical waste.

[h] The CY 2002 chemical waste volume is due to chemical cleanup activities.

[i] The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for CYs 1998 through 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for CY 1998 through CY 2002 information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Impacts

There were relatively few facilities burned at High Explosives Processing. Some of the exceptions included V-Site (an historic Manhattan Project Era site) where all buildings except one were destroyed. Smoke damage was extensive and resulted in replacement of equipment, filter systems, and furnishings of buildings. Fire damaged roofs, and Material Disposal Area (MDA) R suffered an underground fire that required extensive effort to extinguish. In addition, many utility poles burned and wiring melted requiring extensive efforts to restore electrical utilities. Other damage included flooding in a high bay at TA-46, dead rodents in many buildings, destroyed HVAC systems, and miscellaneous damage to drop towers and substations.

2.10 High Explosives Testing (TA-14, TA-15, TA-36, TA-39, TA-40)

The High Explosives Testing Key Facility is located in all or parts of five technical areas, comprises about one-half (22 of 43 square miles) of the land area occupied by LANL, and has 17 associated firing sites. All firing sites are in remote locations and/or within canyons. Major buildings are located at TA-15, and include the Dual Axis Radiographic Hydrodynamic Test (DARHT) facility (Building TA-15-312), Pulsed High-Energy Radiographic Machine Emitting X-rays (PHERMEX) facility (TA-15-184), and the TA-15-306 firing site. Building types consist of preparation and assembly facilities, bunkers, analytical laboratories, explosives storage magazines, and offices. Activities consist primarily of testing high explosives components for nuclear weapons and for Science-Based Stockpile Stewardship Program tests and experiments.

In September 2001, Building TA-15-R183 was placed on the LANL Radiological Facility List (LANL 2001c) and remained on the list in 2002 (LANL 2002b).

2.10.1 Construction and Modifications at High Explosives Testing

Projected: DARHT, Building TA-15-312, was the only facility construction and modification projected by the SWEIS ROD. This facility was evaluated in a separate environmental impact statement (DOE 1995b).

Actual: Construction of DARHT began in 1994, but was interrupted for two years pending resolution of a lawsuit. The facility construction resumed in 1996 and DARHT Axis I was completed in 1999. Installation and component testing of the accelerator and its associated control and diagnostics systems began in late 1999. Construction of DARHT Axis II continued through CY 2002.

Other construction that occurred through 2001 includes the Access Control Building (TA-15-446) that became operational in 1998; the Hydrodynamic Test Operations Control Building (TA-15-484) that became operational in the spring of 1999; and the Applied Research Optics Electronics Laboratory (TA-15-494) was occupied in 2000. The Ector Multi-diagnostic Hydrotest accelerator was taken out of service, but the firing site (TA-15-306) remains active. Also, 12 outfalls were eliminated before 1999 and Outfall 06A-106 was eliminated from the NPDES permit in 1999.

During 2002, construction began on the Vessel Preparation Facility (DOE 1995b), a carpenter shop (DOE 2001b), an X-Ray calibration facility (DOE 2001b), and a warehouse (DOE 2001b) located within TA-15. The carpenter shop, x-ray calibration facility, and warehouse were replacement structures for similar operations destroyed in the Cerro Grande Fire. Additionally, a camera room (DOE 2001c) was built to support experiments at TA-36-12. The strategic planning effort also began.

Table 2.10.1-1 summarizes the construction and modifications at the High Explosives Testing Key Facility.

Table 2.10.1-1. High Explosive Testing Construction and Modifications

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK [a]	2001 YEARBOOK	2002 YEARBOOK
DARHT facility construction and modification	Construction of the DARHT building (TA-15-312) continued.	Construction of the DARHT building (TA-15-312) continued (DOE 1995b).	Construction of the DARHT building (TA-15-312) completed in 1999 (DOE 1995b).	Construction of the DARHT building (TA-15-312) completed in 1999 (DOE 1995b).	
	DARHT cooling tower became operational in 1998.				
		DARHT Axis I operational.			
		Installation and component testing of the accelerator and its associated control and diagnostics systems began in 1999.	Installation and component testing of the accelerator and its associated control and diagnostics systems began in 1999 and continued in 2000.	Installation and component testing of the accelerator and its associated control and diagnostics systems began in late 1999 and continued in 2001.	
					Vessel Preparation Facility constructed at TA-15 (DOE 1995b).
	Hydrodynamic Test Operations Control building (TA-15-484) constructed and became operational in spring 1999 (LANL 1996c).				
	Access Control Building (TA-15-446) became operational in 1998 (DOE 1993b).				
	Ector Multi-diagnostic Hydrotest accelerator taken out of service. (Firing site remains active).				

Table 2.10.1-1. High Explosive Testing Construction and Modifications (continued)

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK [a]	2001 YEARBOOK	2002 YEARBOOK
		Applied Research Optics Electronics Laboratory (TA-15-494, new office and laboratory building) and adjacent parking under construction in 1999 (LANL 1998f).	Construction of Applied Research Optics Electronics Laboratory (TA-15-494, new office building) completed in 2000 (LANL 1998f).		
	Twelve of 14 outfalls eliminated. [b]	Outfall 06A106 at TA-36 eliminated from NPDES permit in 1999.			
			Cerro Grande Fire destroyed DARHT equipment, materials, and storage structures.	Cerro Grande Fire: ~14 facilities destroyed and ~28 damaged; destroyed facilities transferred to decontaminate and decommission in 2001; tree thinning (LANL 2001p).	
				Categorical Exclusion for high explosive storage and preparation facilities at TA-36 (DOE 2001d).	
					Camera room built at TA-36-12 (DOE 2001c).
					Carpenter shop constructed at TA-15 (DOE 2001b).
					X-ray calibration facility constructed at TA-15 (DOE 2001b).
					Warehouse constructed at TA-15 (DOE 2001b).

[a] Additional information on the impacts from the Cerro Grande Fire can be found in Section 2.10.4.

[b] Refer to Table 2.10.3-1 for information on the outfalls that were eliminated.

2.10.2 Operations at High Explosives Testing

The ROD identified seven capabilities for this Key Facility. None of these has been deleted, and no new capabilities have been introduced. Levels of research were below those predicted by the SWEIS ROD. Table 2.10.2-1 identifies the operational capabilities discussed in the SWEIS and presents the 1998–2002 operational data for comparative purposes. The total amount of depleted uranium expended during testing (all capabilities) is an indicator of overall activity levels at this Key Facility. On an annual basis, the quantity of depleted uranium expended has remained well below the SWEIS projections. For example, a total of 216.67 kilograms were expended in 2002, compared to approximately 3,900 kilograms projected by the SWEIS ROD.

2.10.3 Operations Data for High Explosives Testing

The operational data presented in Table 2.10.3-1 indicate that the materials used and effects of research from 1998 through 2002 were considerably less than projections made by the SWEIS ROD. The only operational data exceptions are the chemical waste quantity in 2000 and the LLW quantity in 2001 that exceeded the SWEIS ROD projections. The chemical waste in 2000 was due to cleanup from the Cerro Grande Fire.

DARHT

Table 2.10.2-1. High Explosives Testing (TA-14, TA-15, TA-36, TA-39, and TA-40)/Comparison of Operations

CAPABILITY	SWEIS ROD[a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Hydrodynamic Tests	Conduct up to 100 hydrodynamic tests/yr. Develop containment technology. Conduct baseline and code development tests of weapons configuration. Depleted uranium use of 6,900 lb/yr (over all activities).	Hydrodynamic tests were conducted in 1998 at a level far below those projected in the SWEIS (See Table 2.10.3-1).	Hydrodynamic tests were conducted in 1999 at a level below those projected in the SWEIS.	Hydrodynamic tests were conducted in 2000 at a level below those projected by the SWEIS ROD.	Hydrodynamic tests were conducted in 2001 at a level below those projected by the SWEIS ROD.	Hydrodynamic tests were conducted in 2002 at a level below those projected by the SWEIS ROD.
Dynamic Experiments	Conduct dynamic experiments to study properties and enhance understanding of the basic physics of state and motion for materials used in nuclear weapons including some experiments with SNM.	Dynamic experiments were conducted at a level far below those projected in the SWEIS (See Table 2.10.3-1).	Dynamic experiments were conducted at a level far below those projected in the SWEIS.	Dynamic experiments were conducted at a level below those projected by the SWEIS ROD.	Dynamic experiments were conducted at a level below those projected by the SWEIS ROD.	Dynamic experiments were conducted at a level below those projected by the SWEIS ROD.
Explosives Research and Testing	Conduct high explosives tests to characterize explosive materials.	Explosives research and testing were conducted at a level far below those projected in the SWEIS (See Table 2.10.3-1).	Explosives research and testing were conducted at a level far below those projected in the SWEIS.	Explosives research and testing were conducted at a level below those projected by the SWEIS ROD.	Explosives research and testing were conducted at a level below those projected by the SWEIS ROD.	Explosives research and testing were conducted at a level below those projected by the SWEIS ROD.
Munitions Experiments	Continued support of Department of Defense in conventional munitions. Conduct experiments with projectiles and study other effects on munitions.	Munitions experiments were conducted at a level far below those projected in the SWEIS (See Table 2.10.3-1).	Munitions experiments were conducted at a level far below those projected in the SWEIS.	Munitions experiments were conducted at a level below those projected by the SWEIS ROD.	Munitions experiments were conducted at a level below those projected by the SWEIS ROD.	Munitions experiments were conducted at a level below those projected by the SWEIS ROD.
High-Explosives Pulsed-Power Experiments	Conduct experiments and development tests.	Experiments were conducted at a level far below those projected in the SWEIS (See Table 2.10.3-1).	Experiments were conducted at a level far below those projected.	Experiments were conducted at a level below those projected by the SWEIS ROD.	Experiments were conducted at a level below those projected by the SWEIS ROD.	Experiments were conducted at a level below those projected by the SWEIS ROD.

Table 2.10.2-1. High Explosives Testing (TA-14, TA-15, TA-36, TA-39, and TA-40)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a]	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Calibration, Development, and Maintenance Testing	Conduct tests to provide calibration data, instrumentation development, and maintenance of image processing capability.	Calibration, development, and maintenance testing were conducted at a level far below those projected in the SWEIS (See Table 2.10.3-1).	Calibration, development, and maintenance testing were conducted at a level far below those projected in the SWEIS.	Calibration, development, and maintenance testing were conducted at a level below those projected by the SWEIS ROD.	Calibration, development, and maintenance testing were conducted at a level below those projected by the SWEIS ROD.	Calibration, development, and maintenance testing were conducted at a level below those projected by the SWEIS ROD.
Other Explosives Testing	Develop advanced high explosives or weapons evaluation techniques.	Other explosives testing was conducted at a level far below explosives testing projected in the SWEIS (See Table 2.10.3-1).	Other explosives testing was conducted at a level far below explosives testing projected in the SWEIS.	Other explosives testing was conducted at a level below explosives testing projected by the SWEIS ROD.	Other explosives testing was conducted at a level below explosives testing projected by the SWEIS ROD.	Other explosives testing was conducted at a level below explosives testing projected by the SWEIS ROD.

[a] Includes completion of construction for the DARHT facility and its operation.

Table 2.10.3-1. High Explosives Testing (TA-14, TA-15, TA-36, TA-39, and TA-40)/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Radioactive Air Emissions:							
Depleted Uranium	Ci/yr	1.5E-1 [a]	[b]	[b]	[b]	[b]	[b]
Chemical Usage: [c]							
Aluminum [d]	kg/yr	45,450	624	688	394	78	860
Beryllium	kg/yr	90	1	0.5	2	52	0
Copper [d]	kg/yr	45,630	14	41	88	24	33
Depleted Uranium	kg/yr	3,930	121	67	419	536	216
Lead	kg/yr	240	2	0.5	5	0	0
Tantalum	kg/yr	300	5	0.2	1	12	2
Tungsten	kg/yr	300	0	0	19	0	0
NPDES Discharge:							
Number of outfalls [e]	---	14	4	2	2	2	2
Total discharges	MGY	3.6	1.9	14.23	16	9	1.38
03A-028 (TA-15) [f]	MGY	2.2	0.5	2.81 [g]	5	4	0.5027
03A-185 (TA-15) [f]	MGY	0.73	1.2	11.42 [h]	11	5	0.8773
04A-101 (TA-40)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
04A-139 (TA-15)	MGY	None	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
04A-141 (TA-39)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
04A-143 (TA-15)	MGY	0.018	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
04A-156 (TA-39)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
06A-079 (TA-40) [i]	MGY	0.54	0.1	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
06A-080 (TA-40)	MGY	0.03	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
06A-081 (TA-40)	MGY	0.03	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
06A-082 (TA-40)	MGY	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
06A-099 (TA-40)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
06A-100 (TA-40) [g]	MGY	0.04	0.1	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
06A-106 (TA-36) [j]	MGY	0.0	Eliminated 1999	Eliminated 1999	Eliminated 1999	Eliminated 1999	Eliminated 1999
06A-123 (TA-15)	MGY	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
Wastes:							
Chemical	kg/yr	35,300	444	1,015	60,437 [k]	1,337	1,285
LLW	m^3/yr	940	0	0.01	0.6	0	0
MLLW	m^3/yr	0.9	0	0	0	0	0
TRU/Mixed TRU [l]	m^3/yr	0.2	0	0	0	0	0
Number of Workers	FTEs	619 [m] 227 [m]	93 [m]	227 [m]	212 [m]	245 [m]	264 [m]

[a] The isotopic composition of depleted uranium is approximately 99.7 percent uranium-238, approximately 0.3 percent uranium-235, and approximately 0.002 percent uranium-234. Because there are no historic measurements of emissions from these sites, projections are based on estimated release fractions of the materials used in tests.

Table 2.10.3-1. High Explosives Testing (TA-14, TA-15, TA-36, TA-39, and TA-40)/Operations Data (continued)

[b] No stacks require monitoring; all non-point sources are measured using ambient monitoring. During 1999, a total of 67 kilograms of depleted uranium was expended during these activities.

[c] Usage listed for the SWEIS ROD includes projections for expanded operations at DARHT as well as the other TA-15 firing sites (the highest foreseeable level of such activities that could be supported by the LANL infrastructure). No proposals are currently before DOE to exceed the material expenditures at DARHT that are evaluated in the DARHT Environmental Impact Statement (DOE 1995b).

[d] The quantities of copper and aluminum involved in these tests are used primarily in the construction of support structures. These structures are not expended in the explosive tests, and thus, do not contribute to air emissions.

[e] Outfalls eliminated before 1999: 04A-101 (TA-40), 04A-139 (TA-15), 04A-141 (TA-39), 04A-143 (TA-15), 04A-156 (TA-39), 06A-080 (TA-40), 06A-081 (TA-40), 06A-082 (TA-40), 06A-099 (TA-40), and 06A-123 (TA-15). Consolidation and removal of outfalls has resulted in projected NPDES volumes underestimating actual discharges from the existing outfalls.

[f] The annual quantity of discharge was calculated by using the average daily flow and multiplying by 365 days in the year; this results in an overestimate of volume. A totalizing water meter has been installed on 03A-185 (TA-15), which will allow for much more accurate water usage calculations for 2002 reporting. 03A-28 (TA-15) does not yet have a totalizing water meter and the water use will continue to be averaged.

[g] This outfall discharged during three quarters of CY 1999.

[h] This outfall discharged during all four quarters of CY 1999.

[i] Outfalls 06A-079 and 06A-100 had discharges only part of 1998. Process flows were routed to the HEWTF, and these outfalls were eliminated from the NPDES permit.

[j] This outfall was originally identified with the Non-Key Facilities.

[k] The 2000 chemical waste, as indicated in the 2000 SWEIS Yearbook exceeded the ROD due to cleanup following the Cerro Grande Fire. Construction and demolition debris (previously cited as 'industrial waste' in the Yearbooks) accounted for 9,362 kilograms of the chemical waste, was nonhazardous, and was disposed of in regular landfills. The remainder of the chemical waste was shipped offsite to approved hazardous waste facilities.

[l] TRU waste (steel) will be generated as a result of DARHT's Phased Containment Option (see DARHT Environmental Impact Statement [DOE 1995b]).

[m] The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for CY 1998 through CY 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.10.4 Cerro Grande Fire Effects at High Explosives Testing

Immediate Effects

About 3,040 acres of land within the High Explosives Testing Key Facility burned during the Cerro Grande Fire. Areas most affected were TAs 14, 15, and 40 and, to a lesser extent, TAs 06, 09, 22, and 36. Fire damage was in excess of $16 million.

Fire Effects on High Explosives Testing: Firing site operations were abruptly halted, and High Explosives Testing operations were shut down for approximately four months. Restart proceeded cautiously to ensure safety and security of personnel, the public, the environment, and facilities. Safety and security requirements necessitated that operations be restarted using a graded and methodical approach. Because high explosives firing operations may only be conducted when the airspace is closed, restart of high explosives firing operations was delayed because remediation efforts included aerial reseeding of burned areas.

From the end of May 2000 through August 2001, facility operations personnel were involved in facility recovery activities (reopening more than 400 buildings and restarting operations within them). These efforts included reestablishing security and safety control of firing site perimeters and other outside work areas, walk-downs of all operations, reauthorization of hazardous operations, and daily escorting of many environmental specialists into the area. No worker injuries were reported during the fire recovery period.

The Cerro Grande Fire directly affected DARHT by costing $6.1 million for delays and additional work associated with work stoppage and then recovery. A fraction of the total amount, about $177,000, was attributed to burned and destroyed DARHT equipment, materials, and storage structures.

Fire Effects on High Explosives Processing: The Cerro Grande Fire halted high explosives processing by the High Explosives Testing Key Facility for approximately two months; one month while the Laboratory was closed and one additional month to reopen facilities and restart operations. Before the fire, detonator production was ahead of schedule and production commitments were being met. Because of the fire, work on one production line was transferred to Lawrence Livermore National Laboratory to meet testing schedules.

Continuing Effects

The Cerro Grande Fire has had a long-term effect on the high explosives testing operations. Management has limited high explosives testing at TA-40 to tests that are contained because of adjacent steep canyon walls and excess forest fuels. This self-imposed restriction has created a hardship because these firing sites are no longer available for smaller experiments requiring open-air tests. The restriction remained in place throughout 2002 and still remains in place.

Replacement structures for burned buildings were designed and construction began on two warehouses, a carpenter shop, an X-ray calibration facility, a camera room addition to a firing site, and a high explosive preparation building. Buildings that were transferred to decommissioning and decontamination went through bid document preparation, site visits, and contractor bidding process. Contracts will be awarded and work performed in 2003. Burned trees were removed and remaining forest thinned to reduce the wildland fire potential and make the forest viable and self-sustaining. Trees that were not eligible for firewood use or sale to a sawmill were burned in an air curtain destructor.

DX Division Strategic Plan for the Future

NNSA determined that an environmental assessment was required for this plan and its new structures to be constructed at TA-22, and the subsequent decommissioning and decontamination of old buildings to be replaced. The process began in 2002 with LANL internal organizations and consultants preparing the documents. The environmental assessment, DOE/EA-1447 (DOE 2002c), was started in 2002.

2.11 The Los Alamos Neutron Science Center (TA-53)

The LANSCE Key Facility lies entirely within TA-53. The facility has more than 400 buildings, including one of the largest at LANL. Building 53-3, which houses the linac, has 315,000 square feet under roof. Activities consist of neutron science and nuclear physics research, proton radiography, the development of accelerators and diagnostic instruments, and production of medical radioisotopes. [Note: Isotope production has not occurred since 1998; it will resume after commissioning of the new isotope production facility in 2003.] The majority of the LANSCE Key Facility (the User Facility) is composed of the 800-million-electron-volt linac, a Proton Storage Ring, and three major experimental areas: the Manuel Lujan Neutron Scattering Center, the Weapons Neutron Research (WNR) facility, and Experimental Area C.

Experimental Area C is the location of proton radiography experiments for the Stockpile Stewardship Program. A new experimental facility for the production of ultracold neutrons is under construction in Area B. Experimental Area A, formerly used for materials irradiation experiments and isotope production, is currently inactive; construction of a new isotope production facility was completed in 2002 and commissioning will occur in 2003. A second accelerator facility located at TA-53, Low-Energy Demonstration Accelerator (LEDA), is also inactive.

This Key Facility has three Category 3 nuclear activities (Table 2.11-1): experiments using neutron scattering by actinides in Experimental Area ER-1/ER-2, the 1L neutron production target in Building 53-7, and Area A East in Building 53-3M (LANL 2001b), which is used for passive storage of activated materials. There are no Category 2 nuclear facilities at TA-53. In September 2001, TA-53-945 and 53-954 were placed on the LANL Radiological Facility List (LANL 2001c). TA-53-945 and TA-53-954 remained on the Radiological Facility List in 2002 (LANL 2002b). Experimental Area ER-1/ER-2 is categorized as a Moderate Hazard facility. The remainder of the LANSCE User Facility is categorized as Low Hazard. DOE approved an Interim Safety Assessment Document for the LANSCE accelerator and experimental areas in May 2002. LANSCE began work on a two-year project to update and consolidate existing authorization basis documents for the User Facility.

2.11.1 Construction and Modifications at the Los Alamos Neutron Science Center

Projected: The ROD projected significant facility changes and expansion to occur at LANSCE by December 2005. These changes were the closure of two former sanitary lagoons; make LEDA operational by late 1998; enhance the Short-Pulse Spallation Source; have a one-megawatt target/blanket; construct a new 100-million-electron-volt Isotope Production Facility; have a Long-Pulse Spallation Source (LPSS), including decontamination and renovation of Area A; construct a Dynamic Experiment Lab; construct the Los Alamos International Facility for Transmutation; construct the Exotic Isotope Facility; and decontaminate and renovate Area A-East.

Actual: Table 2.11.1-1 indicates that two of the projected changes have been completed and that four have been started. In addition to these projected construction activities, a new warehouse was constructed in 1998 to store equipment and other materials formerly stored outside, a new waste treatment facility for radioactive liquids generated at LANSCE was constructed during 1999, and construction of a new cooling tower was completed in 2000. These projects received NEPA review through Categorical Exclusions LAN-98-110

(DOE 1998d), LAN-98-109 (DOE 1998e), and LAN-96-022 (DOE 1999c). The two new cooling towers (structure #53-963, 53-952) replace cooling towers 53-60, 53-62, and 53-64, which have been taken off line. The new towers discharge through Outfall 03A-048, as had their predecessors. Construction of two new instruments on Flight Paths 12 and 13 at the Lujan Center started in 2002.

Table 2.11-1. LANSCE Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]
TA-53-1L	1L Target		3	3	3	3	3
TA-53-3M	Experimental Science	3					
TA-53-A-6	Area A East		3	3	3	3	3
TA-53-ER1	Actinide scattering experiments			3	3		
TA-53-ER1/ER-2	Actinide scattering experiments		3			3	3
TA-53-P3E	Pion Scattering Experiment		3	3			
TA-53 Target 4	WNR Neutron Production target					3	

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
[c] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
[d] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
[e] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

The LANSCE Key Facility

Table 2.11.1-1. Los Alamos Neutron Science Center Construction and Modifications

SWEIS ROD PROJECTION	SWEIS REF.	ACTUAL CONSTRUCTION AND MODIFICATION				
		1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK [a]	2001 YEARBOOK	2002 YEARBOOK
Eliminate NPDES Outfall 03A-145 from the Orange Box Building	2-88	Eliminated in 1998.[b]				
Closure of two former sanitary lagoons	2-88	Sampling conducted in 1998.[c]	Remediation started in 1999.	Characterization continued; south lagoon sludge and liner removed.	Data analysis and sampling continued.	Cleanup of north lagoon as Interim Action.[d]
LEDA to become operational in late 1998	2-89	Started high-power conditioning.	Maximum power achieved.		Shutdown in December until funded.	Inactive until funded.[e]
Short-Pulse Spallation Source enhancements	2-90	Upgrades started.	Upgrades started; installation of new instruments began.	First phase of the Proton Storage Ring Upgrade completed.	Proton Storage Ring completed; instruments commissioned.	Upgrades to ion source and 1L line in progress.[f]
One-megawatt target/blanket	2-91	Not completed	Not completed	Not completed	Not completed	Not completed and not funded.
New 100-MeV Isotope Production Facility	2-92		Construction preparations began.	Construction began.	Facility completed; upgrades to beam line in progress.	Readiness Review planned for July 2003 and commissioning for October 2003.
LPSS, including decontamination and renovation of Area A	3-25	Not completed	Not completed	Not completed	Not completed	Not completed and not funded.
Dynamic Experiment Lab	3-25	Not started	Not started	Concept revised [g]	Concept revised [g]	Concept revised [g]
Los Alamos International Facility for Transmutation	3-25	Not completed	Not completed	Not completed	Not completed	Not completed and not funded.
Exotic Isotope Production Facility	3-27	Not completed	Not completed	Not completed	Not completed	Not completed and not funded.
Decontamination and renovation of Area A-East[h]	3-27	Not completed	Not completed	Not completed	Not completed	Not completed
		Outfalls 03A-146 and 03A-125 eliminated from NPDES permit.[i]				
		New warehouse erected at east end of mesa (DOE 1998d).				
			TA-53 radioactive liquid waste treatment facility constructed (DOE 1998e).			

Table 2.11.1-1. Los Alamos Neutron Science Center Construction and Modifications (continued)

SWEIS ROD PROJECTION	SWEIS REF.	ACTUAL CONSTRUCTION AND MODIFICATION				
		1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK [a]	2001 YEARBOOK	2002 YEARBOOK
				Cooling tower 53-963 completed and replaces tower 53-62 (DOE 1999c).		
					Cooling tower 53-952 replaces cooling towers 53-60 and 53-64.	
					ICE House constructed. [j]	
						Started construction of two new instruments on Flight Paths 12 and 13 at the Lujan Center.

[a] Additional information on the impacts of the Cerro Grande Fire can be found in Section 2.11.4.

[b] Outfall 03A-145 was associated with a small swamp cooler for the Orange Box Conference and Office Building (53-06). There was no flow from the outfall. Although there had been no flow, discharge piping from the outfall was tied to the sewage plant at TA-46.

[c] The lagoons were removed from the RCRA closure. Cleanup will be performed as a corrective action. The Environmental Restoration (ER) Project started the cleanup with some sampling in 1998.

[d] Characterization started in 1999 and continued into 2000. Cleanup at the south lagoon began in 2000 with the removal of the sludge and liner. Data analysis and sampling continued through 2001 for both lagoons and an Interim Action Plan was written for remediation of the north lagoon. Cleanup of the north lagoon was done in 2002, but only as an interim action. It is not known at this time if the cleanup will be "final" or if more cleanup is needed. A report will be prepared and submitted to the New Mexico Environment Department (NMED) in the summer of 2003. The site has not been "closed" by NMED.

[e] LEDA started high-power conditioning of the radio-frequency quadrupole power supply in November 1998. The first trickle of proton beam was produced in March 1999, and maximum power was achieved in September 1999. It has been designed for a maximum energy of 12 million electron volts, not the 40 million electron volts projected by the SWEIS ROD. LEDA was shut down in December 2001 and will remain inactive until funding is resolved. (True for 2002; note that the 2003 omnibus bill passed by Congress included funding for LEDA decontamination and decommissioning. The plan is to remove all support equipment and leave the building and the accelerator itself in place.)

[f] Part of the Short-Pulse Spallation Source upgrades have been performed. Upon completion, the project will upgrade the Proton Storage Ring and 1L line to operate at 200 microamperes at 30 hertz (vs. 70 microamperes at 20 hertz present during preparation of the SWEIS); will install a brighter ion source; and will add three neutron-scattering instruments to the Lujan Center. Through the end of 2002, the upgrades to the Proton Storage Ring had been completed, and the three instruments have been installed and commissioned in the Lujan Center. Upgrades to the ion source and 1L line are still in progress. (Note the latter upgrades have been delayed to 2004.)

[g] The Stockpile Stewardship Program is currently using Experimental Area C, Building 53-3P, for proton radiography, and the Blue Room in Building 53-07 for neutron resonance spectroscopy. The concept of combining these experiments in a new Dynamic Experiment Laboratory has been replaced by the concept to construct a $1.6 billion Advanced Hydrotest Facility, which is currently in the conceptual phase. Conceptual planning for the Advanced Hydrotest Facility is being done consistent with the Stockpile Stewardship and Management Programmatic Environmental Impact Statement (DOE 1996b) and ROD. Before DOE decides to build and operate the Advanced Hydrotest Facility at LANL or some other site, an environmental impact statement and ROD would be prepared.

[h] Area A East is used to store the old 1L target. Both the target and residually activated materials such as the 800-million-electron-volt beam stop are why Area A East is designated as a Category 3 nuclear facility.

Table 2.11.1-1. Los Alamos Neutron Science Center Construction and Modifications (continued)

[i] Outfalls 03A-146 and 03A-125 were eliminated from the NPDES permit in 1997 and 1998, respectively. Although no flows are expected because the cooling units have been or are scheduled to be removed, discharge piping for both outfalls was tied in to the sanitary sewer instead and rerouted to the sewage treatment plant at TA-46.

[j] The "ICE House" is a new building completed in 2002. The building houses an experimental station on an existing WNR flight path and provides a new capability at WNR for single-event upset measurements.

2.11.2 Operations at the Los Alamos Neutron Science Center

The SWEIS identified seven capabilities for the LANSCE Key Facility. No new capabilities have been added, and none has been deleted. During CY 2002, LANSCE operated both accelerators and three of the five experimental areas. (Area A has been idle for more than two years; Area B has been idle for several years but a new Ultracold Neutron Facility is under construction.)

The primary indicator of activity for this facility is production of the 800-million-electron-volt LANSCE proton beam as shown in Table 2.11.2-1. These production figures are all less than the 6,400 hours at 1,250 microamps projected by the SWEIS ROD. In addition, there were no experiments conducted for transmutation of wastes. There was also no production of medical isotopes from 1999 through 2002, although construction of a new isotope production facility has been completed. Table 2.11.2-1 provides details.

The most significant accomplishment in CY 2002 for LANSCE is the successful completion of a full run cycle for the three primary experimental facilities: the WNR, the Proton Radiography area, and the Manuel Lujan Jr. Neutron Scattering Center (Lujan Center). LANSCE hosted over 780 user visits this run cycle (June 3–January 26). The facility operated at an average 86 percent availability for the Lujan Center and 88 percent for WNR, allowing the completion of just under 225 experiments for internal and external neutron scattering and neutron nuclear physics users. Construction of two new instruments at the Lujan Center began in 2002. One, IN500, will be used for inelastic neutron scattering studies. The other is NPD-gamma, which will look for violations of the weak nuclear interaction.

A hot cell in the new Isotope Production Facility at LANSCE

Table 2.11.2-1. Los Alamos Neutron Science Center (TA-53)/Comparison of Operations

CAPABILITY	SWEIS ROD[a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Accelerator Beam Delivery, Maintenance, and Development	Deliver LANSCE linac beam to Areas A, B, C, WNR facility, Manuel Lujan Center, Dynamic Experiment Facility, and new isotope production facility for 10 months/yr (6,400 hrs). Positive ion current 1,250 microampere and negative ion current of 200 microampere.	(a) In 1998, positive ion beam was produced for 1,335 hours at an average current of 740 microamps. Negative ion beam was delivered, at varying currents, to Areas A, B, C, WNR facility, and Lujan Center for up to 1,127 hours.	In 1999, H+ beam was not produced. H- beam was delivered, at maximum current of 93 microamps, to lines B and C (505 hours), WNR facility (1,993 hours), and Lujan Center (239 hours). Area A did not receive beam.	In 2000, H+ beam was not produced. H- beam was delivered as follows: (a) to the Lujan Center for 1,749 hours at an average current of 100 microamperes. (b) to WNR Target 2 for 307 hours in a “pulse on demand” mode of operation, with an average current below 1 femtoampere, (c) to WNR Target 4 for 2,024 hours at an average current of 5 microamperes, (d) through Line X to Lines B and C for 806 hours in a “pulse on demand” mode of operation, with an average current below 1 femtoampere.	In 2001, H+ beam was not produced. H- beam was delivered as follows: (a) to the Lujan Center for 2,741 hours at an average current of 55 microamperes, (b) to WNR Target 2 for 350 hours in a “pulse on demand” mode of operation, with an average current below 1 femtoampere, (c) to WNR Target 4 for 1,989 hours at an average current of 5 microamperes, (d) through Line X to Lines B and C for 465 hours in a “pulse on demand” mode of operation, with an average current below 1 femtoampere.	In 2002, H+ beam was not produced. H- beam was delivered as follows: (a) to the Lujan Center for 2,303 hours at an average current of 105 microamperes with 87% total availability (b) to WNR Target 2 for 252 hours in a “pulse on demand” mode of operation, with an average current below 1 femtoampere with 90% total availability (c) to WNR Target 4 for 2,507 hours at an average current of 3.5 microamperes with 88% total availability (d) through Line X to Lines B and C for 384 hours in a “pulse on demand” mode of operation, with an average current below 1 femtoampere with 85% total availability.

Table 2.11.2-1. Los Alamos Neutron Science Center (TA-53)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Accelerator Beam Delivery, Maintenance, and Development (cont.)	Reconfigure beam delivery and support equipment to support new facilities, upgrades, and experiments.[a]	In the fall of 1998, the upgrade to H- injectors to the Proton Storage Ring was completed.	No major upgrades to the beam delivery complex.	No major upgrades to the beam delivery complex.	No major upgrades to the beam delivery complex.	No major upgrades to the beam delivery complex. Material was received for installation of a new switchyard kicker magnet during 2003; this will allow simultaneous operations of Line D (Lujan and WNR) and Line X (Area B and C).
	Commission, operate, maintain LEDA for 10 to 15 years; operate up to approximately 6,600 hrs/yr.	In November 1998, started conditioning the radio frequency quadrupole power supply. No beam was generated in 1998.	Full power (100 milliamps and 6.7 MeV) achieved in September 1999.	Continued to operate at full power (100 milliamps and 6.7 million electron volts).	LEDA was shutdown in December 2001.	LEDA was shutdown in December 2001.
Experimental Area Support	Full-time remote handling and radioactive waste disposal capability required during Area A interior modifications and Area A-East renovation.	Full-time capability maintained. (Note: Modifications and renovations were not undertaken, however.)	Full-time capability maintained. (Note: Modifications and renovations were not undertaken, however.)	Full-time capability maintained. (Note: Modifications and renovations were not undertaken, however.)	Full-time capability maintained. (Note: Modifications and renovations were not undertaken, however.)	Full-time capability maintained. (Note: Modifications and renovations were not undertaken, however.)
	Support of experiments, facility upgrades, and modifications.	Support activities were conducted per the projections of the SWEIS ROD.	Support activities were conducted per the projections of the SWEIS ROD.	Support activities were conducted per the projections of the SWEIS ROD.	Support activities were conducted per the projections of the SWEIS ROD.	Support activities were conducted per the projections of the SWEIS ROD.
	Increased power demand for LANSCE linac and LEDA radio frequency operation.	Started conditioning the radio frequency quadrupole power supply for LEDA in November 1998.	A 700-MHz klystron was developed for use with LEDA.	No developments in 2000.	No developments in 2001.	Average beam current to the Lujan Center was increased to over 100 microamps.

Table 2.11.2-1. Los Alamos Neutron Science Center (TA-53)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Neutron Research and Technology [b]	Conduct 1,000 to 2,000 experiments/yr using Manuel Lujan Center, WNR facility, and LPSS. Establish LPSS in Area A (requires modification).	Far fewer number of experiments since the linac operated only 1,135 hours. LPSS was not constructed.	Far fewer number of experiments, since the Lujan Center was idle from February into July. LPSS was not constructed.	Fewer than 200 experiments were conducted at the Lujan Center. LPSS was not constructed.	113 experiments were conducted at the Lujan Center and 36 experiments at WNR. LPSS was not constructed.	165 experiments were conducted at the Lujan Center and 59 experiments at WNR. LPSS was not constructed.
	Conduct accelerator production of tritium target neutronics experiment for six months.	Accelerator production of tritium target neutronics experiments were begun in Experimental Area C in 1997 and were completed in 1998.				
	Construct Dynamic Experiment Laboratory adjacent to WNR Facility. Support contained weapons-related experiments: With small quantities of actinides, high explosives, and sources (up to approximately 80/yr). With nonhazardous materials and small quantities of high explosives (up to approximately 200/yr) With up to 4.5 kg high explosives and/or depleted uranium (up to approximately 60/yr) Shock wave experiments involving small amounts, up to (nominally) 50 grams plutonium.	The Dynamic Experiment Laboratory was not constructed, but weapons-related experiments were conducted: None with actinides Some with nonhazardous materials and high explosives Some with high explosives, but none with depleted uranium No shock wave experiments.	The Dynamic Experiment Laboratory was not constructed, but weapons-related experiments were conducted: None with actinides Some with nonhazardous materials and high explosives Some with high explosives, but none with depleted uranium No shock wave experiments.	The Dynamic Experiment Laboratory was not constructed, but weapons-related experiments were conducted: None with actinides Some with nonhazardous materials and high explosives Some with high explosives, but none with depleted uranium Some shock wave experiments.	The Dynamic Experiment Laboratory was not constructed, but weapons-related experiments were conducted: None with actinides Some with nonhazardous materials and high explosives Some with high explosives, but none with depleted uranium Some shock wave experiments.	The Dynamic Experiment Laboratory was not constructed, but weapons-related experiments were conducted: None with actinides Some with nonhazardous materials and high explosives Some with high explosives, but none with depleted uranium Some shock wave experiments.
	Provide support for static stockpile surveillance technology research and development.	Support was not provided for surveillance research and development.	Support was not provided for surveillance research and development.	Support was provided for surveillance research and development.	Support was provided for surveillance research and development.	Support was provided for surveillance research and development.

Table 2.11.2-1. Los Alamos Neutron Science Center (TA-53)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Accelerator Transmutation of Wastes[c]	Conduct lead target tests for two years at Area A beam stop.	No tests.	No tests.	No tests.	No tests.	No tests.
	Implement the Los Alamos International Facility for Transmutation. (Establish one-megawatt, then five-megawatt Accelerator Transmutation of Wastes target/blanket experiment areas adjacent to Area A.)	Neither the target/blanket experiment nor the Los Alamos International Facility for Transmutation was constructed.	Neither the target/blanket experiment nor the Los Alamos International Facility for Transmutation was constructed.	Neither the target/blanket experiment nor the Los Alamos International Facility for Transmutation was constructed.	Neither the target/blanket experiment nor the Los Alamos International Facility for Transmutation was constructed.	Neither the target/blanket experiment nor the Los Alamos International Facility for Transmutation was constructed.
	Conduct 5-megawatt experiments for 10 months/yr for four years using about 3 kg of actinides.	No experiments.	No experiments.	No experiments.	No experiments.	No experiments.
Subatomic Physics Research	Conduct 5 to 10 physics experiments/yr at Manuel Lujan Center, WNR facility, and LPSS.	Between 5 and 10 physics experiments were conducted in 1998.	Ultra-cold neutron experiments ran on 5 occasions in the Blue Room.	Ultra-cold neutron experiments ran on 13 days in the “B” line beam tunnel room.	Ultra-cold neutron experiments ran 10 days in the “Blue Room” (target 2).	No ultra-cold neutron experiments were run during 2002 LANSCE beam operations.
	Continue neutrino experiment through FY97.	The neutrino experiment, extended one year, concluded in September 1998.				
	Conduct proton radiography experiments, including contained experiments with high explosives.	Experiments involving contained high explosives were conducted in 1998.	Experiments involving contained high explosives were conducted on 10 days in 1999.	Experiments involving contained high explosives were conducted on 28 days in 2000.	Fewer than 40 experiments involving contained high explosives were conducted in 2001.	42 experiments involving contained high explosives were conducted in 2002.
Medical Isotope Production	Irradiate up to approximately 50 targets/yr for medical isotope production.	Production began in November 1998. Twelve targets were irradiated.	No production in 1999.	No production in 2000.	No production in 2001.	No production in 2002.
	Added production of exotic, neutron-rich, and neutron-deficient isotopes (requires modification of an existing target area).	No production in 1998.	No production in 1999.	No production in 2000.	No production in 2001.	No production in 2002.

Table 2.11.2-1. Los Alamos Neutron Science Center (TA-53)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD[a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
High-Power Microwaves and Advanced Accelerators	Conduct research and development in these areas, including microwave chemistry research for industrial and environmental applications.	Research and development were conducted.	Research and development were conducted.	Research and development were conducted.	Research and development were conducted.	Research and development were conducted.

[a] Includes the completion of proton and neutron radiography facilities, the LEDA, the isotope production facility relocation, the Short-Pulsed Spallation Source, and the LPSS.

[b] Numbers of neutron experiments represent plausible levels of activity. Bounding conditions for the consequences of operations are primarily determined by 1) length and power of beam operation and 2) maintenance and construction activities.

[c] Formerly Accelerator-Driven Transmutation Technology.

2.11.3 Operations Data for the Los Alamos Neutron Science Center

Area A remains inactive. Two outfalls at TA-53 were eliminated with completion of the cooling towers. Since both construction activities, which contribute to waste quantities, and levels of operations were less than those projected by the SWEIS ROD, operations data were also less than projected. Radioactive air emissions are a key parameter since LANSCE emissions have historically accounted for more than 95 percent of the total LANL offsite dose. However, emissions over the past three years have been smaller percentages of the total LANL offsite dose. In 2002, emissions totaled about 4,400 curies or about 70 percent of the total LANL radioactive air emissions of 6,300 curies (all values include diffuse emissions). Emissions in 2001 totaled only about 6,000 curies (including diffuse emissions), about 40 percent of total LANL radioactive air emissions. The 2000 total was also less than projections of the ROD of 8,496 curies (Garvey and Miller 1996). These small emissions can be attributed to non-use of the Area A beam stop. Waste generation and NPDES discharge volumes were well below projected quantities. Table 2.11.3-1 provides details.

2.11.4 Cerro Grande Fire Effects at the Los Alamos Neutron Science Center

LANSCE was nearly untouched by the fire; a small portion of the roof of one building was damaged. Return to operations was in accordance with the LANL-wide recovery procedure (LANL 2000a). Building 53-882 was established as a recovery command post. The TA-53 Facility Recovery Team was established and performed safety reconnaissance and condition assessment during the second week of the evacuation. (LANL was evacuated from Monday, May 8, through Sunday, May 21, 2000.) All LANSCE workers were approved to return to their workstations on Tuesday, May 23, 2000. The only impact to operations was evaluating and restoring the status of accelerator systems since site power was lost during the fire. Systems and equipment were returned to power sequentially instead of simultaneously, and this process required about a month to complete.

Removal of dried radioactive sludge and the plastic liner from a lagoon at LANSCE

Table 2.11.3-1. Los Alamos Neutron Science Center (TA-53)/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Radioactive Air Emissions:							
Argon-41	Ci/yr	7.44E+1	1.52E+02	1.4E+01	2.9E+01	1.6E+1	2.5E+1
Arsenic-73	Ci/yr	Not projected [a]	1.26E-04	Not detected	2.2E-05	7.6E-4 [b]	Not detected
Beryllium-7	Ci/yr	Not projected [a]	1.16E-04	Not detected	Not detected	Not detected	Not detected
Bromine-76	Ci/yr	Not projected [a]	3.65E-02	2.3E-04 [b]	2.6E-04 [b]	1.4E-3 [b]	Not detected
Bromine-77	Ci/yr	Not projected [a]	3.55E-02	Not detected	Not detected	Not detected	Not detected
Bromine-82	Ci/yr	Not projected [a]	7.71E-03	6.3E-04 [b]	4.2E-03 [b]	3.4E-3 [b]	6.0E-3 [b]
Carbon-10	Ci/yr	2.65E+0	1.87E+02	4.2E-02	1.4E-01	2.5E+0	7.3E-1
Carbon-11	Ci/yr	2.96E+3	3.38E+03	2.8E+02	6.9E+02	3.4E+3	2.8E+3
Chlorine-39	Ci/yr	Not projected [a]	3.25E+0	Not detected	Not detected	Not detected	Not detected
Cobalt-60	Ci/yr	Not projected [a]	Not detected	4.0E-06 [b]	Not detected	Not detected	Not detected
Mercury-193	Ci/yr	Not projected [a]	Not detected	Not detected	8.0E-01 [b]	6.9E-1 [b]	4.4E-1 [b]
Mercury-193m	Ci/yr	Not projected [a]	Not detected	Not detected	Not detected	Not detected	4.7E-4 [b]
Mercury-195m	Ci/yr	Not projected [a]	Not detected	Not detected	2.0E-02 [b]	2.4E-2 [b]	8.0E-3 [b]
Mercury-197	Ci/yr	Not projected [a]	6.12E-03	1.6E-03 [b]	1.0E-01 [b]	3.7E-1 [b]	1.6E-1 [b]
Mercury-203	Ci/yr	Not projected [a]	Not detected	Not detected	Not detected	8.6E-3 [b]	6.2E-4 [b]
Nitrogen-13	Ci/yr	5.35E+2	1.28E+03	1.6E	2.8E+01	1.3E+2	1.2E+2
Nitrogen-16	Ci/yr	2.85E-2	1.50E+02	1.5E-02	1.7E-02	2.8E-2	4.7E-1
Oxygen-14	Ci/yr	6.61E+0	5.87E+01	1.0E-01	4.1E-01	3.4E+1	1.5E+1
Oxygen-15	Ci/yr	6.06E+2	2.66E+03	1.9E+01	9.1E+01	2.4E+3	1.5E+3
Potassium-40	Ci/yr	Not projected [a]	7.62E-05	Not detected	Not detected	Not detected	Not detected
Scandium-44M	Ci/yr	Not projected [a]	5.81E-07	Not detected	Not detected	Not detected	Not detected
Sodium-24	Ci/yr	Not projected [a]	1.82E-04	Not detected	Not detected	Not detected	Not detected
Tritium as Water	Ci/yr	Not projected [a]	3.79	2.3 [b]	2.9 [b]	6.4E+0 [b]	Not measured
Vanadium-48	Ci/yr	Not projected [a]	5.29E-06	Not detected	Not detected	Not detected	Not detected
LEDA Projections (8-yr average):							
Oxygen-19	Ci/yr	2.16E-3	Not measured [c]	Not measured [c]	Not measured [c]	Not measured [c]	Not measured [c]
Sulfur-37	Ci/yr	1.81E-3	Not measured [c]	Not measured [c]	Not measured [c]	Not measured [c]	Not measured [c]
Chlorine-39	Ci/yr	4.70E-4	Not measured [c]	Not measured [c]	Not measured [c]	Not measured [c]	Not measured [c]
Chlorine-40	Ci/yr	2.19E-3	Not measured [c]	Not measured [c]	Not measured [c]	Not measured [c]	Not measured [c]
Krypton-83m	Ci/yr	2.21E-3	Not measured [c]	Not measured [c]	Not measured [c]	Not measured [c]	Not measured [c]
Others	Ci/yr	1.11E-3	Not measured [c]	Not measured [c]	Not measured [c]	Not measured [c]	Not measured [c]
NPDES Discharge: [d]							
Total Discharges	MGY	81.8	53.4	37.2	30.5	20.45	24.04
03A-047	MGY	7.1	13.5	3.4	3.5	0	0
03A-048	MGY	23.4	19.1	19.7	15.6	13.05	23.25

Table 2.11.3-1. Los Alamos Neutron Science Center (TA-53)/Operations Data (continued)

PARAMETER	UNITS	SWEIS ROD	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
03A-049	MGY	11.3	20.1	10.8	9.6	5.9	0.14
03A-113	MGY	39.8	0.7	3.3	1.8	1.5	0.65
03A-125	MGY	0.18	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
03A-145	MGY	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
03A-146	MGY	Not projected [e]	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
Wastes:							
Chemical	kg/yr	16,600	55,258[f]	11,060	1,205[g]	4,057	1,999
LLW	m^3/yr	1,085[h]	16	70	28	0.1	0
MLLW	m^3/yr	1	0.4	0.5	4.9	0.2	0.9
TRU	m^3/yr	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0
Number of Workers	FTEs	846[i] 560[i]	547[i]	560 [i]	550[i]	505 [i]	496 [i]

a The SWEIS ROD did not contain projections for these radioisotopes.

b The radionuclide was not projected by the SWEIS ROD because it was either dosimetrically insignificant or not isotopically identified.

c Potential emissions from LEDA were sufficiently small that measurement systems were not necessary to meet regulatory or facility requirements.

d Outfalls eliminated before 1999: 03A-125 (TA-53), 03A-145 (TA-53), and 03A-146 (TA-53).

e This outfall was not listed in the SWEIS.

f Chemical waste in CY 1998 was generated as a result the legacy material action project.

g About one-half of this waste (590 kilograms) was construction and demolition debris (previously identified as industrial solid waste in the Yearbook; nonhazardous) and may be disposed of in regular landfills.

h LLW volumes include decommissioning and renovation of Experimental Area A (Building 53-03M) due to the LPSS project.

i The first number shown in the “SWEIS ROD” column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the “SWEIS ROD” column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for CY 1998 through CY 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.12 Bioscience Facilities (TA-43, TA-3, TA-16, TA-35, and TA-46) (Previously Health Research Laboratory [TA-43])

The Bioscience Key Facility definition includes the main HRL facility (Buildings 43-1, -37, -45, and -20) plus support located at TA-35-85, -2 and -254, TA-03-562 and -1698, and TA-46-158/161, -217, -218, -80, -24, and -31. Additionally, Bioscience has small operations located at TA-16. Operations at TA-43, TA-35-85 and -02, and TA-46-158/161 have chemical, laser, and limited radiological activities that maintain hazardous materials inventory and generate hazardous chemical wastes and very small amounts of LLW. Activities at TA-03-562, -03-1698, and TA-16 have relatively minor impacts because of low numbers of personnel and limited quantities of materials. Bioscience activities at TA-03-1698, the MSL, are accounted for with potential impacts of that Key Facility and are not double-counted here. The new Biosafety Level (BSL) 3 facility, TA-03-1076, located near the MSL, is a Bioscience Division facility and will not be included in the potential impacts analysis of the MSL Key Facility. Bioscience research capabilities focus on the study of intact cells (BSL-1 and -2), cellular components (RNA, DNA, and proteins), instrument analysis (laser and mass spectroscopy), and cellular systems (repair, growth, and response to stressors). All Bioscience activities are classed as Low Hazard nonnuclear in all buildings within this Key Facility; there are no Moderate Hazard nonnuclear facilities or nuclear facilities (LANL 2002a). TA-43-1 is now on the Radiological Facilities list (LANL 2002b).

The Bioscience Key Facility is a consolidation of bioscience functions and capabilities that represent the dynamic nature of the Yearbook, responding to the growth and decline of research and development across LANL.

2.12.1 Construction and Modifications at the Bioscience Facilities

Projected: Outfall 03A-040 exists, but is used only for the discharge of storm waters from the roofs and parking lots. It is likely to be eliminated from the NPDES permit.

Actual: A two-story, 4,500-square-foot wing was dedicated and opened at Building 43-01 in June 1997. The wing has laboratories and offices on both the first and second floors and is primarily used for cytometry research. Although this facility modification was not forecast by the ROD, a NEPA review was conducted, resulting in a Categorical Exclusion for the expansion project (LANL 1995).

Construction of the BSL-3 facility

In addition to the new wing, process waters from cooling of a laser were routed in 1998 to the County sewage treatment facility in Bayo Canyon. As a result, there were no discharges from Outfall 03A-040 in 1998. This outfall was eliminated from the NPDES permit on January 11, 1999. The animal colony was downsized substantially in 1996 and 1997 and eliminated entirely in 1999. Research activities involving radioactive materials were moved into the space previously occupied by the animal colony. In 1999, the volume of radioactive work at HRL had significantly diminished from previous years. This was attributed to technological advances and new methods, such as the use of laser-based instrumentation and chemiluminescense, which do not require the use of radioactive materials. For instance, DNA sequencing predominantly uses laser analysis of fluorescent dyes hooked onto DNA bases instead of radioactive techniques. During 2000, 2001, and 2002, the volume of work with radioactive materials continued to diminish.

In 2000, 2001, and 2002, buildings within TA-43 continued to have interior remodeling and rearranging to accommodate new and existing work. In 2000, the principal change in TA-43-1 resulted from relocation of radionuclide materials handling activities from the first floor north wing to the basement. In 2002, only minor interior changes to accommodate operational changes have occurred.

Growth in the Structural Genomics capability in 2000 resulted in the remodeling of over 1,000 square feet of laboratory and office space at LANL. Bioscience relocated two aspects of Genomics work from TA-43-1 to TA-35-85 to alleviate crowding and allow work to expand. Sequencing instruments were relocated to an undeveloped area of about 800 square feet within Building TA-35-85 that was modified to accept this work. In addition to instruments from TA-43-1, sequencing instruments from the University of New Mexico were also added to TA-35-85. This project is an international collaboration that provides bioscience resources at LANL to scientists all over the world. In 2002, Bioscience has continued the development of TA-35-85. This is a key effort for Bioscience Division. In 2002, the southwest corner of TA-35-85 was remodeled to accommodate Division needs. Phase 1 is now complete. Bioscience Division is planning to continue expansions at TA-35 as Nonproliferation and International Security work is relocated to new buildings.

The addition of Computational Biology to Bioscience in 1999 required remodeling of TA-43-45 to accommodate the growth. This capability requires computing workstations and has affected available office space at TA-43-1. This is a growth capability and will continue to require additional office space. This capability does not generate wastes nor use hazardous materials.

The HRL facility has BSL-1 and BSL-2 work, which includes limited work with infectious microbes and low-toxicity biotoxins, as defined by the Centers for Disease Control and Prevention (CDC). All biosafety activities are regulated by the CDC National Institutes of Health, LANL's Institutional Biosafety Committee, and the Institutional Biosafety Officer. BSL-2 work is expanding as part of LANL's growing Chemical and Biological Nonproliferation Program.

Biosafety Level 3 Facility: During 2002, Bioscience began construction of a BSL-3 facility (LANL 2000c); this activity has progressed substantially. The new BSL-3 facility is specifically designed to safely handle and store infectious organisms. It will enable Los Alamos scientists to fully commit to the national security mission of LANL and to contribute new technological solutions to the global threat of emerging infectious diseases. It will be the first BSL-3 facility in the DOE complex.

Description: The BSL-3 building will be a 3,202-square-foot, stand-alone containment facility that will be located remotely from the Los Alamos townsite, on the canyon west of Diamond Drive and south of Sigma Road. The building near the MSL at the intersection of Diamond Drive and Pajarito Road will contain two laboratory spaces at the BSL-3 level, a larger BSL-2 laboratory area, offices, and related storage and changing rooms. The mechanical system will accommodate directional airflow and negative pressure from the areas of lesser to greater risk, plus door interlocks and high-efficiency particulate air (HEPA) filtration.

Because of the building's small size and the small quantities of samples studied, there is no expected increase in quantities of sewage, solid wastes, or chemical wastes, nor should there be increased demand for utilities. NEPA coverage for this project was provided by the Environmental Assessment for the Proposed Construction and Operation of a BSL-3 Facility at LANL (DOE 2002d) dated February 26, 2002, and a Finding of No Significant Impact (FONSI).

Status: Title II Design of the building occurred from February through September 2002. Construction began October 2002 and is more than 40 percent finished. The building is scheduled for completion in October 2003. Overlapping construction are rigorous readiness assessment activities with a projected completion date of February 2004 after which operations are expected to commence.

The construction and modification activities for the Bioscience Facilities are summarized in Table 2.12.1-1.

Table 2.12.1-1. Construction and Modifications at the Bioscience Facilities

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Outfall 03A-040 exists	Discharge redirected to Los Alamos County sewage treatment plant in 1998.	Outfall eliminated from NPDES permit in 1999.			
	Two-story, 4,500-square-foot wing added to Building 43-01 in 1997.				
	Animal colony downsized in 1996 and 1997.	Animal colony eliminated and research activities with radioactive materials moved into space.			
		Radioactive material work decreased.	Radioactive material work decreased.	Radioactive material work decreased.	Radioactive material work decreased.
			Interior remodeling within TA-43 buildings.	Interior remodeling within TA-43 buildings.	Interior remodeling within TA-43 buildings.
			Genomics work moved from TA-43-1 to TA-35-85 and expanded.		Southwest corner of TA-35-85 remodeled.
		Remodeling of TA-43-45 to accommodate Computational Biology.			
					BSL-3 facility construction began (LANL 2000c).

2.12.2 Operations at the Bioscience Facilities

The SWEIS identified eight capabilities for the HRL (now called the Bioscience Facilities). In 1998, Neurobiology research was moved out of the Bioscience Facility and into space controlled by the Physics Division, the Physics Building at TA-03 (Building TA-03-40). Potential impacts of this capability are accounted for with the Non-Key Facilities.

In 1998, levels of research were greater than they were in 1995 for all capabilities, and two areas of research exceeded ROD projections. The primary reasons for this growth include the human genome project, the study of environmental effects, and research into structural cell biology.

In 1999, creation of Bioscience Division led to definitional changes in the existing capabilities. As part of the establishment of the Bioscience Division, three of the capabilities were renamed, two were combined at a higher level, and one was further defined into two operations as shown below:

- Genomic Studies was renamed Genomics
- Environmental Effects was renamed Environmental Biology
- Structural Cell Biology was renamed Structural Biology
- Cell Biology and DNA Damage and Repair were combined to form Molecular Cell Biology
- Cytometry was further defined as operations in Measurement Science and operations in Diagnostics and Medical Applications.

The Bioscience Division developed three other operations in 1999 (Biologically Inspired Materials and Chemistry, Computational Biology, and Molecular Synthesis). Impacts from these three functions were previously captured in the Non-Key Facilities portion of LANL. The In-Vivo Monitoring facility and capability continues to be located in TA-43, HRL-1 and continues at the previously reported level.

Following these changes, Bioscience Division still has eight broad research capabilities:

1) Biologically Inspired Materials and Chemistry
2) Computational Biology
3) Environmental Biology
4) Genomics
5) Measurement Science and Diagnostics
6) Molecular and Cell Biology
7) Molecular Synthesis
8) Structural Biology

The same set of capabilities still exist, but some have become more visible as research and development in a particular area grows, and some have become less visible as research and development in another area declines. This simply reflects the dynamic nature of a research laboratory.

Growth in Bioscience has resulted in addition of new personnel and expanded operations. While there have been increases in volumes of chemicals used and generation of chemical wastes, Bioscience continues to decommission unfunded work. BSL-2 work is expanding to include use of a non-pathogenic strain of anthrasis–delta Ames, low-toxicity biotoxins (defined by CDC), and DNA from other infectious microbes. The Institutional Biosafety Committee reviews all of this work. In addition, work with DNA from a subset of organisms (select agents) requiring registration with the CDC continues. BSL-2 work does not generate any infectious wastes. Expansion of sequencing efforts was most noticeable but does not generate new wastes or increased volumes of regulated wastes. Upgrades and remodeling have generated minimal construction debris as laboratory areas were cleaned out and equipment was replaced or upgraded. This trend in modernization is expected to continue through 2003. TA-43-1 is at capacity for both office and laboratory activities, and future Bioscience expansion is expected to occur at TA-35-85 and TA-46-158. Bioscience is pursuing a new building at LANL that will consolidate its work and remove activities from TA-43.

Table 2.12.2-1 compares 1998–2002 operations to those predicted by the SWEIS ROD. The table includes the number of FTEs per capability to measure activity levels compared to the SWEIS ROD. These FTEs are not measured the same as the index shown in Table 2.12.3-1 and these numbers cannot be directly compared. All but two of the existing capabilities have activity levels greater than those projected by the SWEIS ROD.

2.12.3 Operations Data for the Bioscience Facilities

Table 2.12.3-1 presents the operations data as measured by radioactive air emissions, NPDES discharges, generated waste volumes, and number of workers. The generation of most waste (chemical, administrative, and MLLW) has decreased from historical levels and was smaller than projections.

2.12.4 Cerro Grande Fire Effects at the Bioscience Facilities

Cerro Grande Fire effects on Bioscience facilities and operations included the loss of office transportables containing computers, intellectual property, and data at TA-46. Some computers and data were lost in homes burned by the fire. Overall, Bioscience, along with other programs at LANL, suffered downtime and loss of productivity during the evacuation and initial damage assessment, recovery, and reentry phases. Smoke damage occurred in several buildings at TA-43 and TA-46-158/161 requiring cleaning or replacement of an air handling system and many replacement air filters. The smoke damaged laser optics requiring their replacement at TA-46-158, -161, and TA-03-1698.

A training exercise, using ROB (Reagentless Optical Biosensor) to test environmental samples

Table 2.12.2-1. Bioscience Facilities/Comparison of Operations

CAPABILITIES	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Biologically Inspired Materials and Chemistry	Not in SWEIS ROD.	Not in SWEIS ROD. This operation was developed in 1999.	Not in SWEIS ROD. This operation was developed in 1999.	Not in SWEIS ROD. This operation was developed in 1999.	Not in SWEIS ROD. This operation was developed in 1999.	In 2002, 17 FTEs were associated with Biologically Inspired Materials and Chemistry.
Computational Biology	Not in SWEIS ROD.	Not in SWEIS ROD. This operation was developed in 1999.	Not in SWEIS ROD. This operation was developed in 1999.	In 2000, there were 25 FTEs, expected to grow to 35 FTEs by 2002.	In 2001, 16 FTEs were associated with Computational Biology.	In 2002, 16 FTEs were associated with Computational Biology.
Environmental Biology (formerly named Environmental Effects)	Research to characterize the extent of diversity in environmental microbes and to understand their functions and occurrences in the environment. (25 FTEs)	In 1998, activities increased about 50% above 1995 levels to 30 FTEs, and exceeded SWEIS ROD projections.	In 1999, 25 FTEs were associated with Environmental Biology. This equals the SWEIS ROD projection and is an increase of 25% over 1995 levels.	In 2000, 20 FTEs were associated with Environmental Biology.	In 2001, 27 FTEs were associated with Environmental Biology.	In 2002, 24 FTEs were associated with Environmental Biology.
Genomics (formerly named Genomic Studies)	Conduct research at current levels utilizing molecular and biochemical techniques to determine and analyze the sequences of genomes (human, microbes and animal). Develop strategies to analyze the nucleotide sequence of individual genes, especially those associated with genetic disorders, infectious disease organisms.	In 1998, activities increased about 10% above 1995 levels to 43 FTEs, but were still below SWEIS ROD projections.	In 1999, 61 FTEs were associated with Genomics. This exceeded the SWEIS ROD projection of 50 FTEs and is an increase of 56% over 1995 levels.	In 2000, 50 FTEs were associated with Genomics.	In 2001, 47 FTEs were associated with Genomics.	In 2002, 47 FTEs were associated with Genomics.

Table 2.12.2-1. Bioscience Facilities/Comparison of Operations (continued)

CAPABILITIES	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Measurement Science and Diagnostics (formerly named Cytometry)	Conduct research utilizing imaging and spectroscopy systems to analyze the structures and functions of subcellular systems and components. (40 FTEs)	In 1998, activities increased 10% above 1995 levels to 33 FTEs, but were below projections made by the SWEIS ROD.	In 1999, 25 FTEs were associated with Measurement Science and Diagnostics, a specialized application of cytometry, microscopy, spectroscopy, and other techniques for molecular detection and diagnosis. In 1999, 10 FTEs were associated with Medical Applications utilizing laser-based molecular analysis techniques to develop tools for clinical diagnosis of disease. The 35 total FTEs in Cytometry is below the 40 FTEs projected in the ROD.	In 2000, 30 FTEs were associated with Measurement Science and Diagnostics.	In 2001, 37 FTEs were associated with Measurement Science and Diagnostics.	In 2002, 37 FTEs were associated with Measurement Science and Diagnostics.
Molecular and Cell Biology (formerly Cell Biology and DNA Damage and Repair)	Conduct research at current levels utilizing whole cells and cellular systems, both in-vivo and in-vitro, to investigate the effects of natural and catastrophic cellular events like response to aging, harmful chemical and physical agents, and cancer.	In 1998, Cell Biology activities increased ~15% above 1995 levels to 29 FTEs, but were still below projections of 35 FTEs made by the SWEIS ROD.	In 1999, 30 FTEs were associated with Molecular Cell Biology. This is less than half of the 70 FTEs projected in the ROD. In 1995, a total of 50 FTEs were associated with Cell Biology and DNA Damage and Repair.	In 2000, 30 FTEs were associated with Molecular Cell Biology.	In 2001, 42 FTEs were associated with Molecular Cell Biology.	In 2002, 42 FTEs were associated with Molecular Cell Biology.

Table 2.12.2-1. Bioscience Facilities/Comparison of Operations (continued)

CAPABILITIES	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Molecular and Cell Biology (formerly Cell Biology and DNA Damage and Repair) (cont.)	The work includes using isolated cells to investigate DNA repair mechanisms. (35 FTEs)	DNA Damage and Repair activities increased ~30% above 1995 levels to 32 FTEs, but were still below projections of 35 FTEs made by the SWEIS ROD.				
Molecular Synthesis	Generate biometric organic materials and construct synthetic biomolecules.	This operation was developed in 1999.	This operation was developed in 1999.	In 2000, 10 FTEs were associated with this capability.	In 2001, 16 FTEs were associated with Molecular Synthesis.	In 2002, 16 FTEs were associated with Molecular Synthesis.
Structural Biology (formerly named Structural Cell Biology)	Conduct research utilizing chemical and crystallographic techniques to isolate and characterize the properties and three-dimensional shapes of DNA and protein molecules. (15 FTEs)	In 1998, activities increased 130% above 1995 levels to 23 FTEs and exceeded SWEIS ROD projections.	In 1999, 60 FTEs were associated with Structural Biology. This exceeded the SWEIS ROD projection of 15 FTEs and is an increase of 500% over 1995 levels.	In 2000, 35 FTEs were associated with Structural Biology.	In 2001, 18 FTEs were associated with Structural Biology.	In 2002, 18 FTEs were associated with Structural Biology.
In-Vivo Monitoring. This is not a Bioscience Division capability; however, it is located at TA-43-HRL-1. Therefore, it is a capability within this Key Facility and is included here.	Perform 3,000 whole-body scans per year as a service to the LANL personnel monitor-ing program, which supports operations with radioactive materials conducted elsewhere at LANL. (5 FTEs)	Conducted 1,068 whole-body scans and 1,737 other counts (detector studies, quality assurance measurements, etc.). In 1998, 5 FTEs were associated with this capability.	Conducted 1,250 whole-body scans and 1,733 other counts (detector studies, quality assurance measurements, etc.). In 1999, 3 FTEs were associated with this capability.	Conducted 1,261 whole-body scans and 718 other counts (detector studies, quality assurance measurements, etc.). In 2000, 3 FTEs were associated with this capability.	Conducted 1,083 whole-body scans and 766 other counts (detector studies, quality assurance measurements, etc.). In 2001, 2.5 FTEs were associated with this capability.	Conducted 1,639 whole-body scans and 641 other counts (detector studies, quality assurance measurements, etc.). In 2002, 3 FTEs were associated with this capability.

[a] FTEs: full-time equivalent scientists, researchers, and other staff supporting a particular research capability.

Table 2.12.3-1. Bioscience Facilities/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Radioactive Air Emissions	Ci/yr	Not estimated	Not measured	Not measured	Not measured	Not measured	Not measured
NPDES Discharge: [a]							
03A-040	MGY	2.5 [b]	No discharge [c]	Eliminated 1999	Eliminated 1999	Eliminated 1999	Eliminated 1999
Wastes:							
Chemical	kg/yr	13,000	2,368	1,691	2,370 [d]	1,359 [d]	4,504 [d]
Biomedical Waste	kg/yr	280 [e]	<60	0	0	0	0
LLW	m^3/yr	34	7	14	0	0	0
MLLW	m^3/yr	3.4	0	0.01	0	0	0
TRU	m^3/yr	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0
Number of Workers	FTEs	250 [f] 98 [f]	82 [f]	98 [f]	110 [f]	116 [f]	108 [f]

[a] Outfall 03A-040 consisted of one process outfall and nine storm drains.

[b] Storm water only.

[c] Process flows were routed in 1998 to Bayo Canyon sewage plant operated by the County.

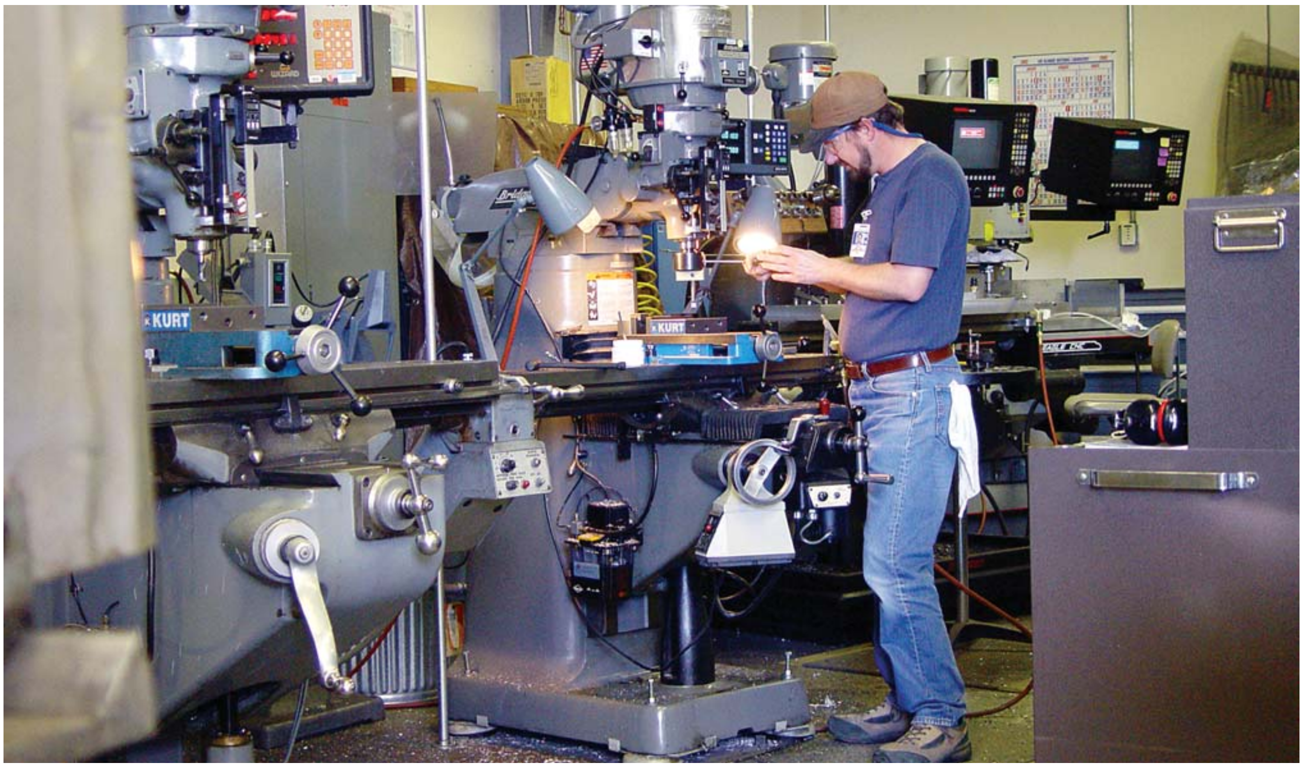
[d] Represents only the Bioscience contribution. Wastes from the other buildings were insignificant and were captured in the Non-Key Facilities totals.

[e] Animal colony and the associated waste. The animal colony waste in CY 1997 was 75 kilograms. The animal colony was downsized substantially in the 1996 to 1997 period and was eliminated in 1999.

[f] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for CYs 2000, 2001, and 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for CYs 2000, 2001, and 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.13 Radiochemistry Facility (TA-48)

The Radiochemistry Key Facility includes all of TA-48 (116 acres). It is a research facility that fills three roles—research, production of medical radioisotopes, and support services to other LANL organizations, primarily through radiological and chemical analyses of samples. TA-48 contains five major research buildings: the Radiochemistry Laboratory (Building 48-1), the Isotope Separator Facility (48-8), the Diagnostic Instrumentation and Development Building (48-28), the Advanced Radiochemical Diagnostics Building (48-45), and the Analytical Facility (48-107). As shown in Table 2.13-1, the Radiochemistry Laboratory has remained a Category 3 nuclear facility (LANL 2002a). During 2003, the Radiochemistry Laboratory (TA-48-01) is expected to transition from a Hazard Category 3 nuclear facility to a radiological facility.



Machine shop at TA-48-8

2.13.1 Construction and Modifications at the Radiochemistry Facility

Projected: The SWEIS projected no facility changes through 2005.

Actual: Although no facility changes were projected in the SWEIS ROD, a few have occurred. In 1996, Building 48-01, Room 346 was converted from a storage area into a chemistry lab with fume hoods, laboratory instrumentation, and hardware such as small furnaces. The lab accommodated personnel moved from TA-21 to TA-48. The modification underwent NEPA review and received a categorical exclusion (DOE 1997c).

Another modification was the upgrade to the ventilation system and the remodeling of the chemistry lab in Building 48-01, Room 430. This modification also underwent NEPA review and received a categorical exclusion (DOE 1998f). In addition, four of the five existing outfalls were eliminated from the NPDES permit during 1997 and 1998. The elimination of the outfalls was evaluated in an environmental assessment (DOE 1996f), and subsequent Finding of No Significant Impact.

Table 2.13-1. Radiochemistry Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]
TA-48-0001	Radiochemistry and Hot Cell	3	3	3	3	3	3

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
[c] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
[d] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
[e] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

During 1999, only minor maintenance activities occurred and the facility's remaining outfall, 03A-045, was eliminated from the Laboratory's NPDES permit on December 6, 1999 (DOE 1996f). Only minor maintenance activities occurred during 2000 and 2001 with the exception of the refurbishment of the Diagnostic Instrumentation and Development Building (48-45; LANL 2001q, DOE 1996g) because of the Cerro Grande Fire and upgrading some of the basement ductwork in the Radiochemistry laboratory (Building 48-01).

During 2002, funds were available to do more than minor maintenance activities at the Radiochemistry Facility. In the summer of 2002, pollution prevention funds were used to replace the refrigerants in two chillers with environmentally friendly refrigerants. Additionally, Building 48-01 underwent several improvements and repairs: the HVAC was improved in part of the building; the roof was repaired; the lightning protection was upgraded; and life safety was improved. The machine shop in the basement of Building 48-01 was moved to Building 48-08. Additionally, an acid neutralization system was installed in Building 48-45. The 50-year-old Building 48-31 was removed and replaced with Building 48-210, a transportable with office space. The machine shop in the basement of Building 48-01 was moved to Building 48-08. Table 2.13.1-1 provides details.

2.13.2 Operations at the Radiochemistry Facility

The SWEIS identified ten capabilities for the Radiochemistry Key Facility. No new capabilities have been added, and none has been deleted. The primary measure of activity for this Key Facility is the number of personnel conducting research. In 2002, approximately 170 chemists and scientists were employed, far below the 250 projected by the SWEIS ROD.[6] As seen in Table 2.13.2-1, only two capabilities were active at levels projected by the SWEIS ROD: Radionuclide Transport Studies, Actinide and TRU Chemistry, and Sample Counting.

2.13.3 Operations Data for the Radiochemistry Facility

The overall level of activity at the Radiochemistry Facility has been below that projected by the SWEIS ROD. Two of the ten capabilities at this Key Facility were conducted at levels projected by the SWEIS ROD; the others were at or below activity levels identified during preparation of the SWEIS. As a result, for the most part, operations data were also below those projected by the SWEIS ROD, as shown in Table 2.13.3-1. An exception occurred during 2000 through 2002 when a large quantity of chemical wastes categorized as industrial solid wastes was generated.[7] These industrial solid wastes are nonhazardous, may be disposed in county landfills, and do not present a threat to the local environs. The quantities of TRU and MLLW generated during 2002 result from the plans to transition TA-48-1 from a nuclear facility to a radiological facility. The wastes generated were shipped to TA-54.

[6] The 170 chemists and scientists listed cannot be directly compared to the FTEs shown in Table 2.13.3-1, because the two numbers represent two different populations of individuals. The 170 chemists and scientists listed include temporary staff, students, and visiting scientists, whereas, the 124 FTEs only includes full-time and part-time regular LANL staff.

[7] In the SWEIS, the term "industrial solid waste" was used for construction debris, chemical waste, and sensitive paper records.

Table 2.13.1-1. Construction and Modifications at the Radiochemistry Facility

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Projected no facility changes through 2005		Minor maintenance: office modifications, chiller replaced, and some basement ventilation removed.	Minor maintenance activities.	Minor maintenance activities.	Minor maintenance activities.
	Building 48-01, Room 346 converted 3,500 square feet of storage space to chemistry laboratory space (DOE 1997c).			Building 48-01 Upgraded some of the basement ductwork.	Building 48-01 replaced refrigerants in two chillers with pollution prevention funds. Improved some HVAC. Repaired roof Upgraded lightning protection. Improved life safety.
	Building 48-01, Room 430. Upgraded the ventilation systems and remodeled chemistry lab (DOE 1998f).				Building 48-01 Removed machine shop from basement.
					Building 48-08 Installed machine shop from Building 48-01.
					Building 48-31 removed.
				Building 48-45 refurbished due to Cerro Grande Fire (LANL 2001q, DOE 1996g).	Building 48-45 Installed acid neutralization system.
					Building 48-210 transportable office building installed to replace TA-48-31.
	Four outfalls eliminated during 1997 and 1998: 04A-016, 04A-152, 04A-131, and 04A-153 (DOE 1996f).	Remaining outfall eliminated: 03A-045 (DOE 1996a).			

Table 2.13.2-1. Radiochemistry Facility (TA-48)/Comparison of Operations

CAPABILITY	SWEIS ROD	1998 OPERATIONS [a]	1999 OPERATIONS [b]	2000 OPERATIONS [c]	2001 OPERATIONS [c]	2002 OPERATIONS [c]
Radionuclide Transport Studies	Actinide transport, sorption, and bacterial interaction studies. Development of models for evolution of groundwater. Assessment of performance or risk of release for radionuclide sources at proposed waste disposal sites. (28 to 34 FTEs [a])	Increased level of operations, approximately twice 1995 levels. (32 FTEs)	Increased level of operations, approximately twice 1995 levels. (35 FTEs)	Increased level of operations, approximately twice levels identified during preparation of the SWEIS. (36 FTEs)	During 2001, operations continued at approximately twice the levels identified during preparation of the SWEIS. (36 FTEs)	During 2002, operations continued at approximately twice the levels identified during preparation of the SWEIS. (36 FTEs)
Environmental Remediation Support	Background contamination characterization pilot studies. Performance assessments, soil remediation research and development, and field support. (34 FTEs[a])	Decreased level of operations, approximately half 1995 levels. (9 FTEs)	Decreased level of operations, approximately half 1995 levels. (10 FTEs)	Decreased level of operations, approximately half levels identified during preparation of the SWEIS. (10 FTEs)	During 2001, operations continued at approximately half the levels identified during preparation of the SWEIS. (10 FTEs)	During 2002, operations continued at approximately half the levels identified during preparation of the SWEIS. (10 FTEs)
Ultra-Low-Level Measurements	Isotope separation and mass spectrometry. (30 FTEs [a])	Slightly increased level of operations, approximately the same as in 1995. (15 FTEs)	Level of operations, approximately the same as in 1995. (14 FTEs)	Level of operations, approximately the same as levels identified during preparation of the SWEIS. (14 FTEs)	Level of operations was approximately the same as levels identified during preparation of the SWEIS. (14 FTEs)	Level of operations was approximately the same as levels identified during preparation of the SWEIS. (14 FTEs)
Nuclear/Radiochemistry	Radiochemical operations involving quantities of alpha-, beta-, and gamma-emitting radionuclides for non-weapons and weapons work. (44 FTEs [a])	Slightly increased level of operations, approximately the same as 1995 levels. (40 FTEs)	Slightly decreased level of operations, but approximately the same as 1995 levels. (35 FTEs)	Slightly decreased level of operations, but approximately the same as levels identified during preparation of the SWEIS. (35 FTEs)	Slightly decreased level of operations, but approximately the same as levels identified during preparation of the SWEIS. (35 FTEs)	Slightly decreased level of operations, but approximately the same as levels identified during preparation of the SWEIS. (35 FTEs)
Isotope Production	Target preparation. High-level beta/gamma chemistry and target processing to recover isotopes for medical and industrial application. (15 FTEs [a])	Slightly increased level of operations, approximately the same as in 1995. (12 FTEs)	Slightly increased level of operations, approximately the same as in 1995. (11 FTEs)	Slightly increased level of operations, but approximately the same as levels identified during preparation of the SWEIS. (11 FTEs)	Slightly increased level of operations, but approximately the same as levels identified during preparation of the SWEIS. (11 FTEs)	Slightly increased level of operations, but approximately the same as levels identified during preparation of the SWEIS. (11 FTEs)

Table 2.13.2-1. Radiochemistry Facility (TA-48)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD	1998 OPERATIONS [a]	1999 OPERATIONS [b]	2000 OPERATIONS [c]	2001 OPERATIONS [c]	2002 OPERATIONS [c]
Actinide/TRU Chemistry	Radiochemical operations involving significant quantities of alpha-emitting radionuclides. (12 FTEs [a])	Increased operations, approximately twice 1995 levels. (14 FTEs)	Increased operations, approximately twice 1995 levels. (13 FTEs)	Increased operations, approximately twice levels identified during preparation of the SWEIS. (14 FTEs)	Increased operations, approximately twice levels identified during preparation of the SWEIS. (14 FTEs)	Significant decrease in quantities of alpha-emitting radionuclides used in operations. (14 FTEs)
Data Analysis	Re-examination of archive data and measurement of nuclear process parameters of interest to weapons radiochemists. (10 FTEs [a])	Slight increase from 1995 to six FTEs, but less than projected by the SWEIS ROD.	Slight increase from 1995 to six FTEs, but less than projected by the SWEIS ROD.	Slight increase from levels identified during preparation of the SWEIS to six FTEs, but less than projected by the SWEIS ROD.	Slight increase from levels identified during preparation of the SWEIS to six FTEs, but less than projected by the SWEIS ROD.	Slight increase from levels identified during preparation of the SWEIS to six FTEs, but less than projected by the SWEIS ROD.
Inorganic Chemistry	Synthesis, catalysis, actinide chemistry: Chemical synthesis of new organo-metallic complexes Structural and reactivity analysis, organic product analysis, and reactivity and mechanistic studies Synthesis of new ligands for radiopharmaceuticals Environmental technology development: Ligand design and synthesis for selective extraction of metals Soil washing Membrane separator development Ultrafiltration (49 FTEs [a]—total for both activities)	Slight decrease from levels in 1995 to 32 FTEs, below projections of the SWEIS ROD.	Same level of activity as in 1995 (35 FTEs), but below projections of the SWEIS ROD.	Same level of activity (35 FTEs) as levels identified during preparation of the SWEIS, but below projections of the SWEIS ROD.	Same level of activity (35 FTEs) as levels identified during preparation of the SWEIS, but below projections of the SWEIS ROD.	Same level of activity (35 FTEs) as levels identified during preparation of the SWEIS, but below projections of the SWEIS ROD.

Table 2.13.2-1. Radiochemistry Facility (TA-48)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD	1998 OPERATIONS [a]	1999 OPERATIONS [b]	2000 OPERATIONS [c]	2001 OPERATIONS [c]	2002 OPERATIONS [c]
Structural Analysis	Synthesis and structural analysis of actinide complexes at current levels. X-ray diffraction analysis of powders and single crystals at current levels. (22 FTEs [a])	Decreased level of operations from 1995, and about 1/3 of those projected by the SWEIS ROD. (6 FTEs)	Decreased level of operations from 1995, and about 1/3 of those projected by the SWEIS ROD. (8 FTEs)	Decreased level of operations from levels identified during preparation of the SWEIS, and about one-third of those projected by the SWEIS ROD. (7 FTEs)	Decreased level of operations from levels identified during preparation of the SWEIS, and about one-third of those projected by the SWEIS ROD. (7 FTEs)	Decreased level of operations from levels identified during preparation of the SWEIS, and about one-third of those projected by the SWEIS ROD. (7 FTEs)
Sample Counting	Measurement of the quantity of radioactivity in samples using alpha-, beta-, and gamma-ray counting systems. (5 FTEs [a])	Approximately the same as SWEIS ROD. (6 FTEs)	Approximately the same as SWEIS ROD. (6 FTEs)	Approximately the same as projected by the SWEIS ROD. (6 FTEs)	During 2001, slight increase in the number of samples projected by the SWEIS ROD. (6 FTEs)	During 2002, slight increase in the number of samples projected by the SWEIS ROD. (6 FTEs)

[a] FTEs: full-time-equivalent scientists, researchers, and other staff supporting a particular research capability.

[b] Projections in the ROD were made as increments to the current level of operations as expressed by the "No Action" alternative for the current (1995) year. Thus, 1999 operations must use increments from 1995 operational levels for comparison.

[c] FTEs: full-time-equivalent. It is imperative that these FTE numbers are not confused with the FTEs identified in Table 2.13.3-1. Two different populations of individuals are represented. The FTEs in this table include students, visitors, and temporary staff. The FTEs in Table 2.13.3-1 only include full-time and part-time regular LANL staff.

Table 2.13.3-1. Radiochemistry Facility (TA-48)/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Radioactive Air Emissions:							
Mixed Fission Products	Ci/yr	1.4E-4	None detected	Not reported [a]	Not reported [a]	Not reported [a]	Not reported
Plutonium-238	Ci/yr	Not Projected [b]	None detected	None detected [c]	None detected [c]	None detected [c]	2.3E-10
Plutonium-239	Ci/yr	1.1E-5	None detected	None detected [c]	None detected [c]	None detected [c]	1.5E-9
Uranium-234	Ci/yr	Not Projected [b]	1.35E-7	None detected [c]	None detected [c]	None detected [c]	Not detected
Uranium-235	Ci/yr	4.4E-7	5.00E-9	None detected [c]	None detected [c]	None detected [c]	Not detected
Mixed Activation Products	Ci/yr	3.1E-6	None detected	Not reported [a]	Not reported [a]	Not reported [a]	Not reported
Uranium-238	Ci/yr	Not Projected [d]	None detected	6.0E-10	None detected [c]	None detected [c]	Not detected
Arsenic-72	Ci/yr	1.1E-4	None detected	None detected [c]	None detected [c]	None detected [c]	Not detected
Arsenic-73	Ci/yr	1.9E-4	None detected	1.8E-5	4.4E-5	4.2E-5	2.3E-3
Arsenic-74	Ci/yr	4.0E-5	9.46E-7	4.5E-5	2.8E-5	1.1E-5	1.2E-3
Beryllium-7	Ci/yr	1.5E-5	None detected	None detected [c]	None detected [c]	None detected [c]	Not detected
Bromine-77	Ci/yr	8.5E-4	8.68E-5	1.2E-5	2.8E-5	None detected [c]	Not detected
Germanium-68	Ci/yr	1.7E-5	None detected	1.7E-3	8.1E-3	1.1E-3	3.4E-3
Gallium-68	Ci/yr	1.7E-5	None detected	1.7E-3	8.1E-3	1.1E-3	3.4E-3
Rubidium-86	Ci/yr	2.8E-7	None detected	None detected [c]	None detected [c]	None detected [c]	Not detected
Selenium-75	Ci/yr	3.4E-4	2.41E-5	3.5E-4	1.4E-4	None detected [c]	3.8E-7
Silicon-32	Ci/yr	Not Projected [e]	Not measured	5.1E-6	Not measured	Not measured	Not measured
NPDES Discharge: [f]							
Total Discharges	MGY	4.1	No Discharge	No Discharge	No Discharge	No discharge	No discharge
03A-045	MGY	0.87	No Discharge	Eliminated 1999 [g]	Eliminated - 1999	Eliminated 1999	Eliminated 1999
04A-016	MGY	None	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
04A-131	MGY	None	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
04A-152	MGY	None	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
04A-153	MGY	3.2	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
Wastes:							
Chemical	kg/yr	3,300	1,990	1,513	12,461 [h]	17,725 [i]	186,135 [j]
LLW	m^3/yr	270	89	44	57	55	34
MLLW	m^3/yr	3.8	0.3	0.6	1.6	2.8	2.2
TRU [k]	m^3/yr	0	0.2	0	0	0	0
MixedTRU [k]	m^3/yr	0	0	0	0	0	0
Number of Workers	FTEs	248 [l] 128 [l]	129 [l]	128 [l]	124 [l]	122 [l]	110 [l]

[a] Although stack sampling systems were in place to measure these emissions, any emissions were sufficiently small to be below the detection capabilities of the sampling systems.

[b] Emission categories of 'mixed fission products' and 'mixed activation products' are no longer used. Instead, where fission or activation products are measured, they are reported as specific radionuclides, e.g., Cesium-137 or Cobalt-60.

Table 2.13.3-1. Radiochemistry Facility (TA-48)/Operations Data (continued)

[c] The SWEIS ROD did not contain projections for this radioisotope.
[d] The radionuclide was not projected in the ROD because it was either dosimetrically insignificant or not isotopically identified.
[e] The Silicon-32 emissions were not expected. There was a slight process problem that resulted in these emissions. The dose from these emissions was not significant.
[f] Outfalls eliminated before 1999: 04A-016 (TA-48), 04A-131 (TA-48), 04A-152 (TA-48), and 04A-153 (TA-48).
[g] This outfall was eliminated from the NPDES permit on December 6, 1999.
[h] Approximately 10,959 kilograms of this chemical waste represents construction and demolition debris (previously identified in the Yearbook as industrial solid waste) resulting from cleanup following the Cerro Grande Fire. The construction and demolition debris is nonhazardous and is disposedin regular county landfills.
[i] Approximately 8,861 kilograms of this waste was generated during chemical cleanouts of TA-48-01 during 2001.
[j] The CY 2002 chemical waste volume includes 182,891.52 kilograms of contaminated soil from a construction project outside TA-48-1. The contamination was from a leaky pipe uncovered during excavation of trenches for new utilities.
[k] TRU waste was projected to be returned to the generating facility.
[l] The first number shown in the “SWEIS ROD” column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the “SWEIS ROD” column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for CY 1998 through CY 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for CY 1998 through CY 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not a ppropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.13.4 Cerro Grande Fire Effects at the Radiochemistry Facility

Six structures were affected by the Cerro Grande Fire. As summarized in Table 2.13.4-1, five suffered only minor effects; activities in these buildings were not affected. Building 48-45, the Advanced Radiochemical Diagnostics Building, however, suffered severe ash, dirt, and soot contamination.

Table 2.13.4-1. Fire-Damaged Structures at TA-48

NO.	STRUCTURE	DAMAGE
48-26	Office building	Replace filters; cleaned
48-33	Office trailer	Replace filters; cleaned
48-45	Advanced Radiological Diagnostics	Damaged
48-56	Office trailer	Roof damage
48-57	Office trailer	Roof damage
48-203	Office trailer	North skirt melted; insulation damaged

The only way to return Building 48-45 to service was to gut its interior. Nearly everything was removed (ceiling tiles, piping, instrumentation, etc.) and disposed as waste. Since this is a laboratory used for sensitive environmental analyses (and hence maintained apart from other TA-48 lab buildings, which host radiological activities), wastes from this cleanup activity were construction and demolition debris (previously indicated in the yearbooks as industrial solid wastes). They were shipped direct from TA-48 to a municipal landfill. The cleanup began in 2000 and continued into 2001.

2.14 Radioactive Liquid Waste Treatment Facility (TA-50)

The RLWTF is located at TA-50 and consists of the treatment facility (Building 50-1), support buildings, and liquid and chemical storage tanks. The primary activity is treatment of radioactive liquid wastes generated at other LANL facilities. The facility also houses analytical laboratories to support waste treatment operations.

As shown in Table 2.14-1, this Key Facility consists of the following structures: the RLWTF itself (Building 50-01), the tank farm and pumping station (50-2), the acid and caustic solution tank farm (50-66), and a 100,000-gallon influent holding tank (50-90). The RWTF is presently considered a single Hazarad Category 3 facility. It is anticipated that it will become a Hazard Category 2 facility upon approval of the submitted Documented Safety Analysis. The Documented Safety Analysis was submitted for review by DOE in the second quarter of FY 2003. The SWEIS identified only the RLWTF main building as a nuclear facility and gave it a ranking of Category 2. There are no other nuclear facilities and no Moderate Hazard nonnuclear buildings within this Key Facility (LANL 2002a).

Initial treatment of radioactive liquid waste by chemical precipitation

Table 2.14-1. Radioactive Liquid Waste Treatment Facility Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]
TA-50-0001	Main Treatment Plant	2	3	3	3	3	3
TA-50-0002	LLW Tank Farm		3	3	3	3	3
TA-50-0066	Acid and Caustic Tank Farm		3	3	3	3	3
TA-50-0090	Holding Tank		3	3	3	3	3

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
[c] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
[d] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
[e] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

2.14.1 Construction and Modifications at the Radioactive Liquid Waste Treatment Facility

Projected: The SWEIS ROD projected three modifications to the RLWTF Key Facility: upgrade the tank farm, install a new UF/RO process, and install nitrate reduction equipment.

Actual: The three modifications to the RLWTF Key Facility projected by the SWEIS ROD were completed. The tank farm was upgraded in 1998. Four aboveground storage tanks were installed in 1997. Upon installation of the aboveground tanks, use of the influent underground storage tanks was to have stopped. However, both the aboveground and all but two of the underground storage tanks are in use. One underground tank was removed from service and is being used as a secondary containment vessel instead. The second underground tank was used to hold sludge generated by the treatment process. This sludge is now held in a metal tank with secondary containment. Sludge has been removed from the underground tanks. This tank is being decommissioned. The new UF/RO process was installed in 1998 and became operational March 22, 1999. Nitrate reduction equipment was installed in 1998 and became operational on March 15, 1999. Unlike the SWEIS description, however, the treatment was by chemical reduction, not biological process. The process treated only small batches of high-nitrate radioactive liquid waste. There have been zero violations of the State of New Mexico discharge agreement for nitrate-nitrogen (10 milligrams per liter) from March through August 2003. And despite a longer break-in for the UF/RO equipment, the RLWTF effluent has been below DOE's guidelines for radioactivity beginning December 10, 1999 and continuing through August 2003.

Facility personnel also installed an electrodialysis reversal unit in 1999 and an evaporator in 2000. Both units process the waste stream from the reverse osmosis unit. They received NEPA coverage through Categorical Exclusions #7428, approved 02/23/99 (DOE 1999d), and #7737, approved 10/29/99 (DOE 1999e). The SWEIS ROD projected neither of these modifications. Additionally, the RLWTF installed ion exchange resins in March 2002 for the removal of perchlorate from the facility effluent water.

Decontamination operations were relocated during 2000 from Building 50-01 to TA-54. Except for the lead decontamination trailer, decontamination operations were moved to the west end of TA-54. Radioactive liquid wastes generated during decontamination operations are collected in two holding tanks at TA-54, which are trucked to the RLWTF at TA-50. The lead decontamination trailer, formerly located between Buildings 50-83 and 50-02, was sent to Area G and decommissioned. The quantity of lead that needed decontamination had become so small that maintaining this operation was no longer cost effective. Building 50-83, the fabrication shop at the RLWTF, has been moved to TA-54 in anticipation of the funding to construct an influent tank farm facility and new pump house.

During 2001, the cross-country transfer line, dedicated to the transfer of radioactive liquid wastes from the TA-21 tritium facilities to the TA-50 RLWTF, was taken out of service, flushed, drained, and capped. For environmental protection, the pipeline was removed from service; it was a single-walled pipe for its entire length (~two miles). Reduction of radioactive liquid waste volumes generated at the TA-21 facilities enabled the line to be taken out of service; the smaller volumes can now be transported from TA-21 to TA-50 or TA-53 by truck. In 2002, the cross-country transfer line was mostly removed as part of land transfer.

Also during 2001, nitrate reduction equipment was removed from service. Source evaluation had shown that more than 70 percent of the nitrates in the LANL radioactive liquid waste were found in less than 1 percent of the waste volume. These low-volume, high-nitrate liquid wastes are now segregated by waste generators and shipped to commercial hazardous waste treatment facilities. Table 2.14.1-1 provides details.

Table 2.14.1-1. Radioactive Liquid Waste Treatment Facility Construction and Modifications

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK [a]	2001 YEARBOOK	2002 YEARBOOK
Replace influent underground storage tanks	Tank farm upgraded by replacing two of three underground storage tanks with four aboveground steel tanks in 1997.				
Install a UF/RO process	Process installed in 1998.	Process became operational in 1999.			
		Installed an electrodialysis reversal unit and began construction of an evaporator to support UF/RO process (DOE 1999d, DOE 1999e).			
					Installation of ion exchange process to remove perchlorate from the RLWTF effluent.
Install nitrate reduction equipment	Equipment installed in 1998.	Equipment became operational in 1999.		Nitrate reduction equipment was removed from service.	
			Decontamination operations relocated from Building TA-50-01 to TA-54.		
			Lead decontamination trailer sent to Area G for decommissioning.		
				Cross-country transfer line between TA-21 and TA-50 RLWTF taken out of service.	
					Begin use of metal tank with secondary containment for holding process sludge.

[a] Additional information on the impacts of the Cerro Grande Fire can be found in Section 2.14.4.

2.14.2 Operations at the Radioactive Liquid Waste Treatment Facility

The SWEIS identified five capabilities for the RLWTF Key Facility. The primary measurement of activity for this facility is the volume of radioactive liquid processed through the main treatment equipment. From 1998 through 2002, all discharge volumes have been less than the projected discharge volume of 35 million liters per year in the SWEIS ROD. In 1998, this volume was 23 million liters of treated radioactive waste discharged to Mortandad Canyon. This is 12 million liters less than the discharge volume of 35 million liters projected by the ROD. In 1999, the discharged volume of treated radioactive waste was 20 million liters, 15 million liters less than projected by the ROD. In 2000, the discharged volume of treated radioactive waste was 19 million liters, 16 million liters less than projected by the ROD. In 2001, the discharged volume of treated radioactive waste was 14 million liters, 21 million liters less than projected by the ROD. In 2002, the RLWTF treated 11.5 million liters of radioactive liquid waste prior to discharging into Mortandad Canyon.

Two factors have contributed to reduced waste volumes. Source reduction efforts re-routed two significant waste streams, nonradioactive discharge waters from a cooling tower at TA-21 and a boiler at TA-48, to the LANL sewage plant during the summer of 2001. Internal recycling also reduced radioactive liquid waste volumes. During 2001 and 2002, process waters were used instead of tap water for the dissolution of chemicals needed in the treatment process. This recycle eliminated approximately two million liters per year of fresh water use. Process waters, instead of tap water, were also used for filter backwash operations. This modification reduced waste volumes by 200,000 liters in 2001 and by 500,000 liters in 2002.

In 2002, a perchlorate removal system was added to the main treatment plant at TA-50. Ion exchange resin columns were installed and placed in service on March 26, 2002, to remove perchlorates from all the RLWTF effluent. To date, the resins have effectively removed perchlorates to less than the 4 parts per billion detection limit in all waters discharged since installation. These actions were taken despite the fact that there are no EPA or New Mexico discharge standards for perchlorate. This project received NEPA review through Categorical Exclusion #8632 (DOE 2002e).

As seen in Table 2.14.2-1, operations at the RLWTF during the 1998–2002 timeframe were below levels projected by the SWEIS ROD.

One of the radioactive liquid waste operators prepares to start the reverse osmosis unit

Table 2.14.2-1. Radioactive Liquid Waste Treatment Facility (TA-50)/Comparison of Operations

CAPABILITY	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Waste Characterization	Support, certify, and audit generator characterization programs.	As projected.	As projected.	As projected.	As projected.	As projected.
Packaging, Labeling	Maintain waste acceptance criteria for radioactive liquid waste treatment facilities.	As projected.	As projected.	As projected.	As projected.	As projected.
Waste Transport, Receipt, and Acceptance	Collect radioactive liquid waste from generators and transport to TA-50.	As projected.	As projected.	As projected.	As projected.	As projected.
Radioactive Liquid Waste Pretreatment	Pretreat 900,000 liters per year of radioactive liquid waste at TA-21.	Pretreated 370,000 liters at TA-21.	Pretreated 45,000 liters at TA-21.	Pretreated 45,000 liters at TA-21.	Pretreated 457,000 liters at TA-21.	Pretreated 36,700 liters at TA-21.
	Pretreat 80,000 liters per year of radioactive liquid waste from TA-55 in Room 60.	Pretreated 39,000 liters in Room 60.	Pretreated less than 80,000 liters in Room 60.	Pretreated 9,000 liters in Room 60.	Pretreated 22,000 liters in Room 60.	Pretreated 35,400 liters in Room 60.
	Solidify, characterize, and package 3 m^3 per year of TRU waste sludge in Room 60.	No TRU waste sludge was treated; solidification was conducted in Room 60 (5 m^3 in 1997; 5 m^3 in 1999).	Solidified 5 m^3 of TRU waste in Room 60.	Solidified 5 m^3 of TRU waste sludge in Room 60.	No TRU waste sludge was solidified in Room 60.	No TRU waste sludge was solidified in Room 60.
Radioactive Liquid Waste Treatment	Install UF/RO equipment in 1997. Install equipment for nitrate reduction in 1999.	UF/RO equipment installed in 1998. Nitrate reduction equipment installed in 1998.	UF/RO equipment operational in March 1999. Nitrate reduction equipment operational in March 1999.	UF/RO equipment operational in March 1999. Nitrate reduction equipment operational in March 1999.	UF/RO equipment installed in 1998 and subsequently removed in 2001. Nitrate reduction equipment installed in 1998 and subsequently removed in 2001.	UF/RO equipment installed in 1998. Nitrate reduction equipment installed in 1998 and subsequently removed in 2001.
	Treat 35 million liters per year of radioactive liquid waste.	Treated 23 million liters of radioactive liquid waste.	Treated 20 million liters of radioactive liquid waste.	Treated 19 million liters of radioactive liquid waste.	Treated 14 million liters of radioactive liquid waste.	Treated 11.5 million liters of radioactive liquid waste.
	De-water, characterize, and package 10 m^3 per year of LLW sludge.	De-watered 28 m^3 of LLW sludge.	De-watered 37 m^3 of LLW sludge.	De-watered 48 m^3 of LLW sludge.	De-watered 60 m^3 of LLW sludge.	Produced 52 m^3 of de-watered LLW sludge.
	Solidify, characterize, and package 32 m^3 per year of TRU waste sludge.	No TRU waste sludge was solidified.	No TRU waste sludge was solidified.	No TRU waste sludge was solidified.	Solidified 5 m^3 of TRU waste sludge.	No TRU waste sludge was solidified.

Table 2.14.2-1. Radioactive Liquid Waste Treatment Facility (TA-50)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
						Installation of ion exchange resin columns to remove perchlorates from all the RLWTF effluent.
Decontamination Operations	Decontaminate LANL personnel respirators for reuse (~700 per month).	Decontaminated 500 personnel respirators per month.	Decontaminated 425 personnel respirators per month.	Decontaminated 450 personnel respirators per month.	No activity.[b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity.[b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.
	Decontaminate air-proportional probes for reuse (~300 per month).	Decontaminated 250 faces and 200 bodies per month.	Decontaminated 93 faces and 94 bodies per month.	Decontaminated about 125 air-proportional probes per month.	No activity.[b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity.[b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.
	Decontaminate vehicles and portable instruments for reuse (as required).	Decontaminated two vehicles in 1998 and eight portable instruments per month.	Decontaminated 26 drill bits, 12 augers, four collars, and six portable instruments per month.	Decontaminated six portable instruments per month. No large-item decontamination was performed.	No activity.[b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity.[b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.
	Decontaminate precious metals for resale (acid bath).	Decontamination of precious metals started in 1998 via decon of platinum from TRU waste to LLW.	Decontaminated platinum from TRU waste to LLW.	No activity.	No activity.[b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity.[b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.
	Decontaminate scrap metals for resale (sandblast).	Decontaminated 11 m^3 of scrap metals.	Decontaminated no scrap metals	Decontaminated 386 ft^3 of metal and 58 ft^3 of circuit boards for recycle.	No activity.[b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity.[b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.
	Decontaminate 200 m^3 of lead for reuse (grit blast).	Decontaminated one m^3 of lead.	Decontaminated 2.3 m^3 of lead.	Decontaminated 0.15 m^3 of lead.	No activity.[b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity.[b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.

[a] Includes installation of UF/RO and nitrate reduction processes in Building 50-01 and installation of aboveground tanks for the collection of influent radioactive liquid waste.
[b] Decontamination operations are reported as part of the Solid Radioactive and Chemical Waste Key Facility.

2.14.3 Operations Data for the Radioactive Liquid Waste Treatment Facility

In 1998, liquid effluent from the RLWTF did not meet DOE's discharge criteria for water quality. In order to improve effluent quality, the treatment process was upgraded in 1999 to include UF/RO equipment. These process modifications have contributed to improved effluent quality. Calendar year 2002 marked the third consecutive year that there were zero violations of the State of New Mexico discharge agreement for nitrates, zero violations of NPDES permit limits, and zero exceedances of the DOE discharge standards for radioactive liquid wastes. Annual average nitrate-nitrogen discharges were reduced from 360 milligrams per liter in 1993 to less than 10 milligrams per liter in 2000 and remained at the less-than-10-milligram-level through 2002. Similarly, annual average radioactive discharges were reduced from greater than 250 picocuries alpha activity per liter during the period 1993–1999 to 13 picocuries per liter in 2000, 18 picocuries per liter in 2001, and 15 picocuries per liter in 2002.

The SWEIS ROD did not project the quality of effluent, only quantity. This and other consequences of operation were less than projected in the SWEIS ROD. Radioactive air emissions continued to be negligible (less than one microcurie); NPDES discharge volume was 2.9 million gallons, compared to a projected 9.3 million gallons; the quantity of LLW sludge was higher than projected in part due to the removal of sludge from the concrete sludge storage tank in WM-2. Table 2.14.3-1 provides details.

2.14.4 Cerro Grande Fire Effects at the Radioactive Liquid Waste Treatment Facility

The RLWTF was one of the very few facilities that operated during the Cerro Grande Fire. Operations were mandatory because readioactive liquid wastes continued to be generated at a rate of approximately 6,000 to 7,000 gallons per day during the two weeks that LANL was closed because of the fire (McClenahan 2000). These flows would be expected from cooling systems and experiments that required cooling during the stand-down. Subsequent to the wildfire, radioactive liquid waste generation continued below typical rates because other LANL facilities required time to resume normal levels of operations.

An analytical laboratory at the RLWTF

Table 2.14.3-1. Radioactive Liquid Waste Treatment Facility (TA-50)/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 OPERATIONS	1999 OPERATIONS	2000 OPERATIONS	2001 OPERATIONS	2002 OPERATIONS
Radioactive Air Emissions:							
Americium-241	Ci/yr	Negligible	6.5E-09	1.3E-07	Not detected	Not detected	1.3E-08
Plutonium-238	Ci/yr	Negligible	1.4E-08	3.4E-08	9.8E-09	3.8E-08	1.6E-08
Plutonium-239	Ci/yr	Negligible	Not detected	1.8E-08	Not detected	4.5E-09	3.1E-08
Thorium-230	Ci/yr	Negligible	7.7E-08	3.7E-08	5.3E-08	Not detected	Not detected
Uranium-234	Ci/yr	Negligible	1.8E-07	Not detected [a]	Not detected	Not detected	Not detected
Uranium-238	Ci/yr	Not projected	Not detected	Not detected	Not detected	Not detected	2.5E-08
NPDES Discharge:							
051	MGY	9.3	6.1	5.3	4.9	3.6	2.9
Wastes: [b]							
Chemical	kg/yr	2,200	384	201	384 [c]	68,792 [d]	1,143
LLW	m^3/yr	160	132	175	132	517 [e]	193
MLLW [f]	m^3/yr	0	1.3	3.2	2.5	2.6	3.7
TRU	m^3/yr	30	1	0	16.1	0.4	1.9
Mixed TRU	m^3/yr	0	1.4	4.8	0	4.4	0.2
Number of Workers	FTEs	110 [g] 62 [g]	55 [g]	62 [g]	58 [g]	47 [g]	54 [g]

[a] Although stack sampling systems were in place to measure these emissions, any emissions were sufficiently small to be below the detection capabilities of the sampling system.

[b] Secondary wastes are generated during the treatment of radioactive liquid waste and as a result of decontamination operations performed at this Key Facility until CY 2000. Examples include decontamination acid bath solutions and rinse waters, high-efficiency particulate air filters, personnel protective clothing and equipment, and sludges from the pretreatment and main radioactive liquid waste treatment processes.

[c] Approximately 127 kilograms of the chemical wastes are construction and demolition debris (previously identified in the yearbook as industrial solid wastes) resulting from cleanup following the Cerro Grande Fire. Construction and demolition debris is nonhazardous, may be disposed of in county landfills, and does not represent a threat to local environs.

[d] Approximately 68,584 kilograms of the chemical waste were generated as a result of replacement of storage tanks and some associated plumbing at TA-50. The waste consisted of soil piles and asphalt associated with the pad the old tanks were sitting on.

[e] To comply with the water quality standard of 20 picocuries, wastewater from tritium experiments is occasionally sent to the Evaporation Basins at TA-53. During CY 2001, approximately 380 cubic meters of water were transferred to TA-53.

[f] RCRA-listed hazardous chemicals were not projected to be used in RLWTF, and secondary mixed wastes were therefore not projected to be generated.

[g] The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for CY 1998 through CY 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for 1998 through 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.15 Solid Radioactive and Chemical Waste Facilities (TA-50 and TA-54)

The Solid Radioactive and Chemical Waste Key Facilities are located at TA-50 and TA-54. Activities are all related to the management (packaging, characterization, receipt, transport, storage, and disposal) of radioactive and chemical wastes generated at other LANL facilities.

It is important to note that LANL's waste management operation captures and tracks data for waste streams (whether or not they go through the Solid Radioactive and Chemical Waste Facilities), regardless of their points of generation or disposal. This includes information on the waste generating process; quantity; chemical and physical characteristics of the waste; regulatory status of the waste; applicable treatment and disposal standards; and the final disposition of the waste. The data are ultimately used to assess operational efficiency, help ensure environmental protection, and demonstrate regulatory compliance.

There are three Category 3 nuclear buildings within this Key Facility: the Radioactive Materials Research Operations and Demonstration (RAMROD) Facility (Building 50-37); the Waste Characterization, Reduction, and Repackaging (WCRR) facility (Building 50-69), and the Radioactive Assay and Nondestructive Test Facility (RANT; Building 54-38). In addition, there are also several Category 2 nuclear facilities/operations; the LLW disposal cells, shafts, and trenches and fabric domes and buildings within Area G; the Transuranic Waste Inspection Project (TWISP) for the retrieval of TRU wastes, including storage domes 226 and 229–232; and outdoor operations at the WCRR facility. In addition to the nuclear facilities, has a radiological facility. The Decontamination and Volume Reduction System (DVRS), TA-54-412, was added to the radiological facility list in 2002 (LANL 2002b).

As shown in Table 2.15-1, the SWEIS recognized 19 structures as having Category 2 nuclear classification (Area G was recognized as a whole and then individual buildings and structures were also recognized). RAMROD was only a potential nuclear facility in the SWEIS, but subsequently was characterized by DOE. The WCRR facility was identified as a Category 2 in the SWEIS, but because of inventories and the newer guidelines, it was downgraded to a Category 3. Area G has remained a Category 2 facility when taken as a whole.

2.15.1 Construction and Modifications at the Solid Radioactive and Chemical Waste Facilities

Projected: The SWEIS ROD projected two construction activities for this Key Facility: the construction of four additional fabric domes for the storage of TRU wastes retrieved from earth-covered pads and the expansion of Area G.

Actual: Only one of the two construction activities projected by the SWEIS ROD has been completed. The construction of four additional fabric domes for the storage of TRU wastes retrieved from earth-covered pads was completed in 1998. Although expansion of Area G has not yet begun, the possibility exists for initiation of radioactive and mixed waste storage and disposal operations in Zone 4 within the next one to two years. Planning for the new facility previously intended for construction over Pad 4 to house high-activity drums was stopped after Title I design.

Construction of the DVRS began in 1999 and was completed in 2002. This is a high-bay metal building with 13,000 square feet under roof. The DVRS is designed to segregate, decontaminate, and volume-reduce fiberglass-reinforced plywood crates of TRU waste retrieved from the TWISP storage pads. A major fraction of the resulting segregated wastes is anticipated to be decontaminated to LLW, which will both (a) allow these wastes to be disposed of at Area G and (b) decrease the volume of wastes that must be shipped to WIPP for disposal. DVRS (TA-54-412) is now on the Radiological Facilities list (DOE 2002b). Although construction of the DVRS was not projected by the SWEIS ROD, NEPA coverage was provided through an environmental assessment (DOE 1999f) and subsequent Finding of No Significant Impact in June 1999.

Table 2.15-1. Solid Radioactive and Chemical Waste Buildings with Nuclear Hazard Classification

BUILDING	DESCRIPTION	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]
TA-50-0037	RAMROD		2	2	2	2	3
TA-50-0069	WCRR Facility Building	2	3	3	3	3	3
TA-50-0069 Outside	Nondestructive Analysis Mobile Activities			2	2	2	2
TA-50-0069 Outside [f]	Drum Storage			2	2	2	
TA-54-Area G	LLW Storage/Disposal	2	2	2	2	2	2
TA-54	TWISP		2	2	2	2	2
TA-54-0002 [g]	TRU Storage Building		3	3	3		2
TA-54-0033	TRU Drum Preparation	2		2		2	2
TA-54-0038	Radioassay and Nondestructive Testing Facility	2	3	3	3	3	3
TA-54-0048	TRU Storage Dome	2	3	3	3		2
TA-54-0049	TRU Storage Dome	2	3	3	3		2
TA-54-0144	Shed						
TA-54-0145	Shed	2		2			
TA-54-0146	Shed	2		2			
TA-54-0153	TRU Storage Dome	2	3	3	3		2
TA-54-0177	Shed	2		2			
TA-54-0224	Mixed Waste Storage Dome						2
TA-54-0226	TRU Storage Dome	2		2			
TA-54-0229	Tension Support Dome	2		2			
TA-54-0230	Tension Support Dome	2		2			
TA-54-0231	Tension Support Dome	2		2			
TA-54-0232	Tension Support Dome	2		2			2
TA-54-0283	Tension Support Dome	2		2			2
TA-54-0375	TRU Storage Dome	2		2			
TA-54-Pad2	Storage Pad	2		2		2	2
TA-54-Pad3	Storage Pad	2		2			2
TA-54-Pad4	TRU Storage	2		2			2
TA-54 Pit 2	TRU Waste Storage Dome				2		

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
[c] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
[d] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
[e] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)
[f] In the most recent nuclear facility lists (LANL 2001b) and (LANL 2002a), “Drum Storage” includes drum staging/storage pad and waste container temperature equilibration activities outside TA-50-69.
[g] This includes LLW (including mixed waste) storage and disposal in domes, pits, shafts, and trenches. TRU waste storage in domes and shafts (does not include TWISP). TRU legacy waste in pits and shafts. Low-level disposal of asbestos in pits and shafts. Operations building: TRU waste storage.

In addition, decontamination operations were relocated during 2000 from the RLWTF, Building 50-01, to TA-54. Except for the lead decontamination trailer, activities were moved to Building 54-1009 at the west end of TA-54. Building 54-1014, an office trailer, has also become part of the operations.

Radioactive liquid wastes will be collected in two holding tanks (1,000 gallons each) adjacent to 54-1009; they will be trucked to the RLWTF at TA-50. In addition, two transportainers have been installed. One will become a 90-day storage area for management of hazardous and mixed radioactive waste; the other will be used for storage of supplies. The lead decontamination trailer was removed from service. The trailer is currently stored inside Area G and will be decommissioned.

To control storm water runoff from TA-54, check dams were installed during 2000 at Area G and a sediment basin constructed in the canyon below Area G. NEPA review of this action was provided through a Categorical Exclusion, #7489 (DOE 1999g).

The Off-Site Source Recovery (OSR) Project recovers and manages unwanted radioactive sealed sources and other radioactive material that

- present a risk to public health and safety,
- present a potential loss of control by a U.S. Nuclear Regulatory Commission (NRC) or agreement state licensee, or
- are excess and unwanted and are a DOE responsibility under Public Law 99-240 or are DOE-owned.

The project is sponsored by DOE's Office of Technical Program Integration and the Albuquerque Operations Office Waste Management Division that operates from LANL. It focuses on the problem of sources and devices held under NRC or agreement state licenses for which there is no disposal option. The project was reorganized in 1999 to more aggressively recover and manage the estimated 18,000 sealed-source devices that will become excess and unwanted over the next decade. This reorganization combined three activities, the Radioactive Source Recovery Program, the Off-Site Waste Program, and the Pu-239/Be Neutron Source Project. Approximately 2,020 sources were collected for storage at TA-54 during CY 2002. Eventually, these sources will be shipped to WIPP for final disposition. The OSR Project received NEPA coverage under an environmental assessment and subsequent Finding of No Significant Impact (DOE 1995c), #6279 (DOE 1996i), #7405 (DOE 1999h), and #7570 (DOE 1999i), the 1999 SWEIS (DOE 1999a), and a Supplement Analysis to the 1999 SWEIS (DOE 2000d).

In 2002 LANL submitted a request for Change During Interim Status (CDIS) to the NMED. The CDIS asked for permission to combine two previously RCRA-regulated units (Pad 2 and Pad 4) into a single RCRA-regulated storage unit (Pad 10). The CDIS was approved by NMED, but no construction has begun to date.

Also, in 2002, LANL submitted a closure plan for three RCRA-regulated storage units at TA-50. These units were TA-50, Building 1, room 59, TA-50-114, and TA-50-37. The first two units are located at the RLWTF and the third is at RAMROD. Although the closure plan has not yet been approved, closure activities have been completed at the two units at RLWTF. To date there has been no work conducted towards closure of the final unit at RAMROD (TA-50-37). Table 2.15.1-1 provides details.

2.15.2 Operations at the Solid Radioactive and Chemical Waste Facilities

The SWEIS identified eight capabilities for this Key Facility. One capability, Decontamination Operations, was transferred in 2000 from the RLWTF Key Facility. Therefore, there are now nine capabilities at the Solid Radioactive and Chemical Waste Facilities because one has been added, and none has been deleted. The primary measurements of activity for this facility are volumes of newly generated chemical, low-level, and TRU wastes to be managed and volumes of legacy TRU waste and MLLW in storage. A comparison of CY 2002 to projections made by the SWEIS ROD can be summarized as follows:

Chemical wastes: Approximately 2,250 metric tons of chemical waste were generated at LANL during CY 2002. Of this, approximately 2,057 metric tons were shipped directly offsite for treatment and/or disposal and approximately 194 metric tons were shipped for offsite treatment and/or disposal from the Solid Radioactive and Chemical Waste Facility. These compare to an average quantity of 3,250 metric tons per year projected by the SWEIS ROD.

LLW: In 2002, approximately 7,000 cubic meters were placed into disposal cells and shafts at Area G, compared to an average volume of 12,230 cubic meters per year projected by the SWEIS ROD. This LLW volume is an increase from the last year of operations but is consistent with the three years prior. No new disposal cells were constructed, and disposal operations did not expand into either Zone 4 or Zone 6 at TA-54. Operations could expand into Zone 4 within the next one to two years.

MLLW: In 2002, 20 cubic meters of MLLW were generated and delivered to TA-54, compared to an average volume of 632 cubic meters per year projected by the SWEIS ROD. This is well under the projections in the SWEIS ROD.

TRU wastes: There were two shipments of legacy TRU waste to WIPP during 2002, and the entire quantity of newly generated TRU wastes (206 cubic meters) was added to storage.

In summary, chemical and radioactive waste management activities were at levels below those projected by the SWEIS ROD and also below levels of 1998 and 1999 operations at this Key Facility. These and other operational details appear in Table 2.15.2-1.

2.15.3 Operations Data for the Solid Radioactive and Chemical Waste Facilities

Levels of activity in 2002 were less than projected by the SWEIS ROD and so were air emissions and most secondary wastes. Table 2.15.3-1 provides details.

2.15.4 Cerro Grande Fire Effects at the Solid Radioactive and Chemical Waste Facility

The Solid Radioactive and Chemical Waste Key Facility was inaccessible for routine operations for two weeks during the wildfire. The impact continued upon re-opening of the Laboratory since the facility was returned to normal operations in phases only upon completion of a series of condition assessment steps. Construction was delayed about five weeks, and routine operations took about four weeks to return to normal levels. A significant fraction of the facility's heavy earthmoving equipment was used for the wildfire and was not available for some time. The wildfire also impacted operations later in the year because fire-related debris was shipped to Area G for storage and/or disposal.

Loading shipping casks

Truck shipment to WIPP

Table 2.15.1-1. Solid Radioactive and Chemical Waste Facilities Construction and Modifications

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Four additional fabric domes for storage of retrieved TRU waste	Domes 54-231, 54-232, and 54-375 constructed. Dome 54-226 usage changed from retrieval to storage for TWISP.	Dome 54-375 completed.			
Area G expansion for waste storage	Not yet needed.	Not yet needed.	Not yet needed.	Not yet needed.	Not yet needed.
	Automated and enclosed drum washers installed in Drum Preparation Facility, Building 54-33.				
	Modular containment for size reduction removed from Building 54-33.				
	Small compactor removed from Compactor Facility, Building 54-281.				
	Maintenance Shop, Building 54-02, converted into a counting laboratory for "Green is Clean."				
		Construction of DVRS began (DOE 1999f).			
			Decontamination operations relocated from TA-50-01 to TA-54.		
			Lead decontamination trailer from TA-50 removed from service and awaiting decommissioning at Area G.		
			Check dams installed at Area G for storm water runoff control (DOE 1999g).		
					Storage of sources recovered from OSR Project.
					Plan submitted to close three RCRA regulated storage units at TA-50.

Table 2.15.2-1. Solid Radioactive and Chemical Waste Facilities (TA-50 and TA-54)/Comparison of Operations

CAPABILITY	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Waste Characterization, Packaging, and Labeling	Support, certify, and audit generator characterization programs.	As projected.	As projected.	As projected.	As projected.	As projected.
	Maintain waste acceptance criteria for LANL waste management facilities.	As projected.	As projected.	As projected.	As projected.	As projected.
	Characterize 760 m^3 of legacy MLLW.	Characterized 136 m^3 of legacy MLLW in 1998.	Characterized 83 m^3 of legacy MLLW.	Characterized 11 m^3 of legacy MLLW.	Characterized 59 m^3 of legacy MLLW.	Characterized 42 m^3 of legacy MLLW.
	Characterize 9,010 m^3 of legacy TRU waste.	Characterized 21 m^3 of TRU waste during 1996-1998.	Characterized 6.25 m^3 of legacy TRU waste in 1999.	No TRU waste was fully characterized in 2000.	Characterized 83 m^3 of TRU waste in 2001.	Characterized 14.4 m^3 of TRU waste in 2001.
	Verify characterization data at the RANT Facility for unopened containers of LLW and TRU waste.	Verified characterization data at RANT Facility for TRU wastes, but not for LLW.	Verified characterization data at RANT Facility for TRU wastes, but not for LLW.	Verified characterization data at RANT Facility for TRU wastes, but not for LLW.	Verified characterization data at RANT Facility for TRU wastes, but not for LLW.	Verified characterization data at RANT Facility for TRU wastes, but not for LLW.
	Maintain waste acceptance criteria for offsite treatment, storage, and disposal facilities.	As projected.	As projected.	As projected.	As projected.	As projected.
	Over-pack and bulk waste as required.	As projected.	As projected.	As projected.	As projected.	As projected.
	Perform coring and visual inspection of a percentage of TRU waste packages.	Two drums were cored and inspected.	Six drums were cored and inspected in 1999.	Coring operations were suspended until homogenous analytical capabilities are added to the RAMROD Facility.	Coring operations were suspended until homogenous analytical capabilities are added to the RAMROD Facility.	Performed visual inspection of 13 m^3 of TRU waste packages. No coring was performed in 2002.
	Ventilate 16,700 drums of TRU waste retrieved during TWISP.	Ventilated 4,816 drums during 1996-1998.	Ventilated 8,426 drums as of December 1999.	Ventilated 622 drums during 2000 reaching a total of 9,048 as of December 2000.	Ventilated 7,085 drums during 2001 reaching a total of 16,133 as of December 2001.	Ventilated 766 drums during 2002.
	Maintain current version of WIPP waste acceptance criteria and liaison with WIPP operations.	As projected.	As projected.	As projected.	As projected.	As projected.

Table 2.15.2-1. Solid Radioactive and Chemical Waste Facilities (TA-50 and TA-54)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Compaction	Compact up to 25,400 m^3 of LLW.	94 m^3 of LLW was compacted into 35 m^3.	280 m^3 of LLW was compacted into 77 m^3.	353 m^3 of LLW was compacted into 84 m^3.	483 m^3 of LLW was compacted into 108 m^3.	Approximately 271 m^3 of LLW was compacted into 63 m^3.
Size Reduction	Size reduce 2,900 m^3 of TRU waste at WCRRF and the Drum Preparation Facility.	Size reduction was not performed in 1998.	Size reduction was not performed in 1999.	As proof-of-principle testing for the Decontamination and Volume Reduction System Facility, 100 m^3 of TRU waste were processed and reduced to 60 m^3.	As proof-of-principle testing for the Decontamination and Volume Reduction System Facility, 40 m^3 of waste were recharacterized and disposed of as LLW at TA-54, Area G.	Approximately 32 m^3 of TRU waste were processed through the DVRS. Over 85% was characterized as LLW and disposed of at TA-54, Area G.
Waste Transport, Receipt, and Acceptance	Collect chemical and mixed wastes from LANL generators and transport to TA-54.	Collected and transported chemical and mixed wastes.	Collected and transported chemical and mixed wastes.	Collected and transported chemical and mixed wastes.	Collected and transported chemical and mixed wastes.	Collected and transported chemical and mixed wastes.
	Begin shipments to WIPP in 1999.	No shipments to WIPP.	Shipments to WIPP began 3/26/1999.	Shipments to WIPP began 3/26/1999.	Shipments to WIPP began 3/26/1999.	Shipments to WIPP began 3/26/1999.
	Over the next 10 years, ship 32,000 metric tons of chemical wastes and 3,640 m^3 of MLLW for offsite land disposal restrictions, treatment, and disposal.	1,767 metric tons of chemical waste and 136 m^3 of MLLW were shipped for offsite treatment and disposal.	882 metric tons of chemical waste and 96 m^3 of MLLW were shipped for offsite treatment and disposal.	450 metric tons of chemical waste and 11 m^3 of MLLW were shipped for offsite treatment and disposal.	504 metric tons of chemical waste and 46 m^3 of MLLW were shipped for offsite treatment and disposal.	Approximately 194 metric tons of chemical waste and ~42 m^3 of MLLW were shipped for offsite treatment and disposal.
	Over the next 10 years, ship no LLW for offsite disposal.	No LLW was shipped for offsite disposal.	No LLW was shipped for offsite disposal.	No LLW was shipped for offsite disposal.	No LLW was shipped for offsite disposal.	No LLW was shipped for offsite disposal.
	Over the next 10 years, ship 9,010 m^3 of legacy TRU waste to WIPP.	No legacy TRU waste was shipped to WIPP.	6.25 m^3 of legacy TRU waste were shipped in 1999.	No legacy TRU waste was shipped in 2000.	8 shipments of legacy TRU waste were shipped in 2001.	2 shipments of legacy TRU waste were shipped in 2002.
	Over the next 10 years, ship 5,460 m^3 of operational and environmental restoration TRU waste to WIPP.	No operational or environmental restoration TRU wastes were shipped to WIPP.	No operational or environmental restoration TRU wastes were shipped to WIPP.	No operational or environmental restoration TRU wastes were shipped to WIPP.	No operational or environmental restoration TRU wastes were shipped to WIPP.	No operational or environmental restoration TRU wastes were shipped to WIPP.

Table 2.15.2-1. Solid Radioactive and Chemical Waste Facilities (TA-50 and TA-54)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Waste Transport, Receipt, and Acceptance (cont.)	Over the next 10 years, ship no environmental restoration soils for offsite solidification and disposal.	No environmental restoration soils were shipped for offsite solidification and disposal.	No environmental restoration soils were shipped for offsite solidification and disposal in 1999.	No environmental restoration soils were shipped for offsite solidification and disposal in 2000. [b]	No environmental restoration soils were shipped for offsite solidification and disposal in 2001. [b]	No environmental restoration soils were shipped for offsite solidification and disposal in 2002. [b]
	Annually receive, on average, 5 m^3 of LLW and TRU waste from offsite locations in 5 to 10 shipments.	There were no LLW or TRU waste receipts from offsite locations.	There were no LLW or TRU waste receipts from offsite locations.	There were no LLW or TRU waste receipts from offsite locations.	There were no LLW or TRU waste receipts from offsite locations.	There were no LLW or TRU waste receipts from offsite locations.
Waste Storage	Stage chemical and mixed wastes before shipment for offsite treatment, storage, and disposal.	Chemical and mixed wastes were staged before shipment.	Chemical and mixed wastes were staged before shipment.	Chemical and mixed wastes were staged before shipment.	Chemical and mixed wastes were staged before shipment.	Chemical and mixed wastes were staged before shipment.
	Store legacy TRU waste and MLLW.	Legacy TRU waste and MLLW stored.	Legacy TRU waste and MLLW stored.	Legacy TRU waste and MLLW stored.	Legacy TRU waste and MLLW stored.	Legacy TRU waste and MLLW stored.
	Store LLW uranium chips until sufficient quantities have accumulated for stabilization.	LLW uranium chips are no longer generated.	LANL still generates this waste; however, TA-54 no longer accepts it for storage. The generator is required to process this waste to make it acceptable for disposal at TA-54.	Two drums of uranium chips in storage at Area G.	There are no drums of uranium chips in storage awaiting stabilization.	There are no drums of uranium chips in storage awaiting stabilization.
Waste Retrieval	Begin retrieval operations in 1997.	Retrieval begun in 1997.	Retrieval begun in 1997.	Retrieval begun in 1997.	Retrieval begun in 1997.	Retrieval begun in 1997.
	Retrieve 4,700 m^3 of TRU waste from Pads 1, 2, 4 by 2004.	Retrieved 1,951 m^3 through 1998 (Pad 1).	Retrieved 2,195 m^3 in 1999. Retrieved 4,146 m^3 total through Dec. 1999.	Retrieved 169 m^3 in 2000. Retrieved 4,315 m^3 total through Dec. 2000.	Retrieved 1,463 m^3 in 2001. Retrieved 4,700 m^3 total through Dec. 2001.	Retrieval activities were completed in 2001. No retrieval occurred in 2002.
Other Waste Processing	Demonstrate treatment (e.g., electrochemical) of MLLW liquids.	No activity.	No activity.	No activity.	No activity.	No activity.
	Land farm oil-contaminated soils at Area J.	No oil-contaminated soils were land-farmed.	No oil-contaminated soils were land-farmed.	No oil-contaminated soils were land-farmed.	Area J is undergoing closure.	Closure of Area J is now complete.

Table 2.15.2-1. Solid Radioactive and Chemical Waste Facilities (TA-50 and TA-54)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Other Waste Processing (cont.)	Stabilize 870 m^3 of uranium chips.	No uranium chips were stabilized. Waste stream was treated by generator prior to transfer to Area G.	No uranium chips were stabilized in 1999.	No uranium chips were stabilized.	8.3 m^3 of uranium chips and turnings were stabilized at TA-3, Building 39.	7.2 m^3 of uranium chips and turnings were staged for processing.
	Provide special-case treatment for 1,030 m^3 of TRU waste.	None.	None.	None.	None.	None.
	Solidify 2,850 m^3 of MLLW (environmental restoration soils) for disposal at Area G.	No environmental restoration soils were solidified	No environmental restoration soils were solidified	No environmental restoration soils were solidified.	No environmental restoration soils were solidified.	No environmental restoration soils were solidified.
Disposal	Over next 10 years, dispose of 420 m^3 of LLW in shafts at Area G.	5 m^3 of LLW were disposed of in shafts at Area G.	23 m^3 of LLW were disposed of in shafts at Area G.	13 m^3 of LLW were disposed of in shafts at Area G.	9 m^3 of LLW were disposed of in shafts at Area G.	Approximately 8.5 m^3 of LLW were disposed of in shafts at Area G.
	Over next 10 years, dispose of 115,000 m^3 of LLW in disposal cells at Area G. (Requires expansion of onsite LLW disposal operations beyond existing Area G footprint.)	1,807 m^3 of LLW was disposed of in cells. Area G was not expanded.	1,320 m^3 of LLW was disposed of in cells. Area G was not expanded.	4,441 m^3 of LLW was disposed of in cells. Area G was not expanded.	1,808 m^3 of LLW was disposed of in cells. Area G was not expanded.	Approximately 7,000 m^3 of LLW was disposed of in cells. Area G was not expanded.
	Over next 10 years, dispose 100 m^3 per year administratively controlled industrial solid wastes, but refers to personnel information or contracts in pits at Area J.[c]	55 m^3 solid wastes disposed of in pits at Area J.	4,003 m^3 solid wastes disposed of in pits at Area J [d].	5,839 m^3 solid wastes disposed of in pits at Area J.	Area J is undergoing closure.	Closure of Area J is now complete.
	Over next 10 years, dispose non-radioactive classified wastes in shafts at Area J.	One cubic meter of classified solid wastes disposed of in shafts at Area J.	0.28 m^3 of classified solid wastes disposed of in shafts at Area J.	0.79 m^3 of classified solid wastes disposed of in shafts at Area J.	Area J is undergoing closure.	Closure of Area J is now complete.
Decontamination Operations [e]	Decontaminate LANL personnel respirators for reuse (~700/month).	See Table 2.14.2-1.	See Table 2.14.2-1.	See Table 2.14.2-1.	Decontaminated 450 personnel respirators per month at TA-54-1009.	Decontaminated 500 personnel respirators per month at TA-54-1009.
	Decontaminate air-proportional probes for reuse (~300/month).	See Table 2.14.2-1.	See Table 2.14.2-1.	See Table 2.14.2-1.	Decontaminated 125 faces and 120 bodies per month at TA-54-1009.	Decontaminated 70 faces and 70 bodies per month at TA-54-1009.

Table 2.15.2-1. Solid Radioactive and Chemical Waste Facilities (TA-50 and TA-54)/Comparison of Operations (continued)

CAPABILITY	SWEIS ROD [a]	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
	Decontaminate vehicles and portable instruments for reuse (as required).	See Table 2.14.2-1.	See Table 2.14.2-1.	See Table 2.14.2-1.	Decontaminated five portable instruments per month at TA-54-1009. No large-item decontamination was performed.	Decontaminated six portable instruments per month at TA-54-1009. No large-item decontamination was performed
	Decontaminate precious metals for resale (acid bath).	See Table 2.14.2-1.	See Table 2.14.2-1.	See Table 2.14.2-1.	No activity. [f]	No activity. [f]
	Decontaminate scrap metals for resale (sandblast).	See Table 2.14.2-1.	See Table 2.14.2-1.	See Table 2.14.2-1.	No activity. [f]	No activity. [f]
	Decontaminate 200 m^3 of lead for reuse (grit blast).	See Table 2.14.2-1.	See Table 2.14.2-1.	See Table 2.14.2-1.	No activity. [f]	No activity. [f]

[a] Includes the construction of four new storage domes for the TWISP.

[b] The ER Project usually ships soils removed in remediation of a potential release site (PRS) directly to an offsite disposal facility. These wastes do not typically require processing at TA-54 and do not go through the TA-54 operations for shipment.

[c] In the SWEIS, the term "industrial solid waste" was used for construction debris, chemical waste, and sensitive paper records.

[d] This volume exceeds projections because of excavation of MDA-P by the ER Project.

[e] The Decontamination Operations capability was identified with the RLWTF Key Facility in the SWEIS. Activities prior to 2000 are reported in Section 2.14.2 of the Yearbook. In 2000, this capability was relocated to TA-54 and the Solid Radioactive and Chemical Waste Facility.

[f] Although there has been no activity in 2001 and 2002, this decontamination operation is now part of the Solid Radioactive and Chemical Waste Facility Capabilities

Table 2.15.3-1. Solid Radioactive and Chemical Waste Facilities (TA-54 and TA-50)/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Radioactive Air Emissions: [a]							
Tritium	Ci/yr	6.09E+1	[a]	[a]	[a]	[a]	[a]
Americium-241	Ci/yr	6.60E-7	[a]	[a]	[a]	5.8E-11	7.5E-10
Plutonium-238	Ci/yr	4.80E-6	1.3E-09	9.9E-11	[a]	3.6E-11	5.0E-10
Plutonium-239	Ci/yr	6.80E-7	[a]	[a]	[a]	2.7E-10	1.3E-09
Uranium-234	Ci/yr	8.00E-6	1.14E-08	1.7E-08	[a]	[a]	2.4E-10
Uranium-235	Ci/yr	4.10E-7	[a]	[a]	[a]	[a]	Not detected
Uranium-238	Ci/yr	4.00E-6	[a]	2.3E-09	[a]	[a]	Not detected
Thorium-230	Ci/yr	Not projected	3.10E-10	Not detected	Not detected	Not detected	Not detected
NPDES Discharge	MGY	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls
Wastes: [b]							
Chemical	kg/yr	920	327	30	806	449	863
LLW	m^3/yr	174	15	21	13	14	35
MLLW	m^3/yr	4	0	0	0	0	0
TRU	m^3/yr	27	20.9	39.9	27.1	9.7	29.5
Mixed TRU	m^3/yr	0	0	0	7.8	13.1	15.1
Number of Workers	FTEs	225 [c] 65 [c]	60 [c]	65 [c]	64 [c]	60 [c]	63 [c]

[a] Data indicate no measured emissions at WCRR facility and the RAMROD facility at TA-50. No stacks require monitoring at TA-54. All non-point sources at TA-50 and TA-54 are measured using ambient monitoring.

[b] Secondary wastes are generated during the treatment, storage, and disposal of chemical and radioactive wastes. Examples include repackaging wastes from the visual inspection of TRU waste, HEPA filters, personnel protective clothing and equipment, and process wastes from size reduction and compaction.

[c] The number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for CYs 2000, 2001, and 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for CYs 2000, 2001, and 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.16 Non-Key Facilities

The balance, and majority, of LANL buildings are referred to in the SWEIS as Non-Key Facilities. Non-Key Facilities house operations that do not have potential to cause significant environmental impacts. These buildings and structures are located in 30 of LANL's 49 technical areas and comprise approximately 14,224 of LANL's estimated 26,480 acres. As expressed in Section 2.16.2 below, activities in the Non-Key Facilities encompass seven of the eight LANL direct-funded activities (DOE 1999a, page 2-2).

As shown in Table 2.16-1, the SWEIS identified six buildings within the Non-Key Facilities with nuclear hazard classifications. The High-Pressure Tritium Facility (Building TA-33-86), classified in 2001 as a Category 2 nuclear facility, was removed from the Nuclear Facility List in March 2002 and downgraded to a radiological facility. The decontamination and decommissioning of the formerly used tritium facility, TA-33-86, the High-Pressure Tritium Laboratory, was completed in 2002 and is now demolished. At the present time, there are no Category 2 or Category 3 nuclear facilities among the Non-Key Facilities (LANL 2002a).

Table 2.16-1. Non-Key Facilities with Nuclear Hazard Classification

BUILDING	DESCRIPTION	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]
TA-03-0040	Physics Building	3					
TA-03-0065	Source Storage	2					
TA-03-0130	Calibration Building	3					
TA-33-0086	Former Tritium Research	3	2	2	2	2	
TA-35-0002	Non-American National Standards Institute Uranium Sources	3	3				
TA-35-0027	Safeguard Assay and Research	3	3				

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
[c] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
[d] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
[e] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

Additionally, several Non-Key Facilities were identified as radiological facilities in 2001 (LANL 2001c) and 2002 (LANL 2002b). These include the Omega West Reactor, Building 2-1; the Cryogenics Building B, 3-34; the Physics Building (HP), 3-40; the Lab Building, 21-5; Nuclear Safeguards Research, 35-2; Nuclear Safeguards Lab, 35-27; and the Underground Vault, 41-1. Table 2.16-2 lists all of the Non-Key Facilities identified as radiological in CY 2001 and CY 2002.

Table 2.16-2. Non-Key Facilities with Radiological Hazard Classification

BUILDING	DESCRIPTION	LANL 2001 [a]	LANL 2002 [b]
TA-02-1	Omega Reactor	RAD	RAD
TA-03-16	Ion Exchange	---	RAD
TA-03-34	Cryogenics Bldg. B	RAD	RAD
TA-03-40	Physics Bldg. (HP)	RAD	RAD
TA-03-169	Warehouse	---	RAD
TA-03-1819	Experiment Mat'l Lab	---	RAD
TA-21-5	Lab Bldg	RAD	RAD
TA-21-150	Molecular Chemical	RAD	---
TA-33-86	High Pressure Tritium	---	RAD
TA-35-2	Nuclear Safeguards Research	RAD	RAD
TA-35-27	Nuclear Safeguards Lab	RAD	RAD
TA-36-1	Laboratory and offices	---	RAD
TA-36-214	Central HP Calibration Facility	---	RAD
TA-41-1	Underground Vault	RAD	RAD
TA-41-4	Laboratory	RAD	---

[a] LANL Radiological Facility List (LANL 2001c)
[b] LANL Radiological Facility List (LANL 2002b)

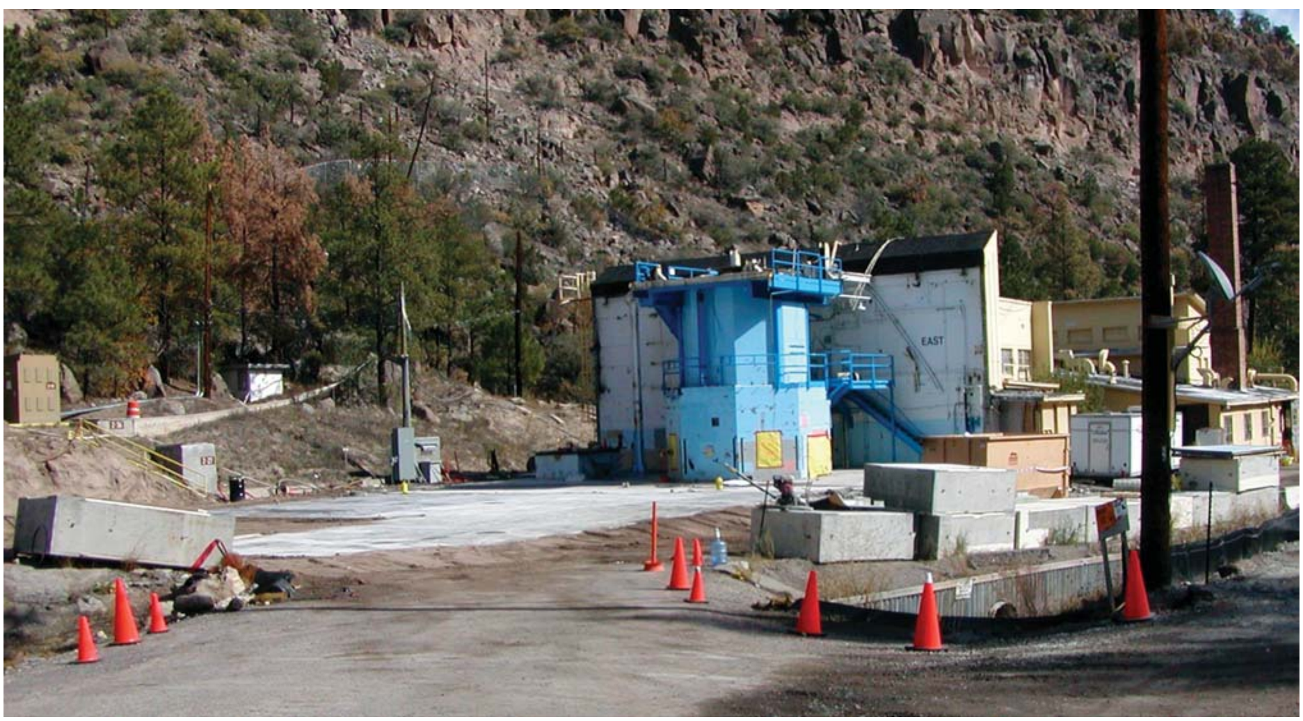
2.16.1 Construction and Modifications at the Non-Key Facilities

Projected: The SWEIS addressed the impacts of the proposed transfer of the DP Road Tract to the County of Los Alamos (DOE 1997d) and the proposed Lease of Land for the Development of a Research Park (DOE 1997e) that were being finalized in 1999. Although the SWEIS did not identify any other "firm" projected construction and modification projects for the Non-Key Facilities, there was a section, Section 1.6.3.1 of Volume I, recognizing "Emerging Actions at LANL." This section identified studies addressing the renovation of the infrastructure at TA-03, the Nonproliferation and International Security Center (NISC), and electrical power supply and reliability. The section also indicated that NEPA analysis would occur as these and other studies developed into projects. Also, at the time of SWEIS publication, the impacts of the electric power demand and water usage for the proposed Strategic Computing Complex (SCC) were factored into the alternatives analyzed and DOE was preparing an Environmental Impact Statement for the Conveyance and Transfer of Certain Land Tracts at LANL.

Actual: Some activity has occurred on each of the projected activities identified in the SWEIS. Table 2.16.1-1 summarizes the actual construction and modifications at the Non-Key Facilities and the text that follows presents additional detail.

In 2002, NEPA coverage for disposition of the Omega West Facility was provided by the *Environmental Assessment of the Proposed Disposition of the Omega West Facility* (DOE 2002f) and a Finding of No Significant Impact. Demolition activities began in July 2002. At TA-61, Buildings 24, 25, and 26 have been completely demolished. TA-02-1, the Omega West Reactor, is 60 percent demolished. TA-41-30 and the front of TA-41-4 were demolished from August through October 2002. Approximately 60 percent of the demolition project is complete with an estimated completion date of September 2003.

The SWEIS ROD had projected just one major construction project (Atlas) for the Non-Key Facilities. In contrast, however, LANL plans for the next 10 years call for the construction or modification of many buildings due to programmatic requirements and replacement of damaged or destroyed facilities following the Cerro Grande Fire (LANL 2001r). Major projects are discussed in the following paragraphs.



Blue structure—Omega West Reactor housing

Table 2.16.1-1. Non-Key Facilities Construction and Modifications

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK [a]	2001 YEARBOOK	2002 YEARBOOK
Land Transfer –DP Road Tract	Under study environmental assessment prepared.	Under study.	Under study.	Under study.	Under study, see Chapter 5.
Research Park	Environmental assessment prepared (DOE 1997d).	Construction started in 1999.	Began construction of first building at Los Alamos Research Park.	Construction of first building completed in March 2001; occupancy began in June 2001.	Most of first building leased.
Renovate TA-03 infrastructure					
NISC	Environmental assessment prepared (DOE 1999j).	Building design began in 1999.	Design continued.	Construction began at TA-03 in March 2001.	Construction continued.
Electrical power supply and reliability					
SCC	Environmental assessment prepared for SCC at TA-03 (DOE 1998g).	Began construction of SCC in 1999.	Construction continued.	Construction completed; occupancy began in December 2001.	Occupancy completed.
Atlas Facility	Atlas Facility designed and began construction in 1996-1998 at TA-35 (DOE 1996j).	Construction continued in 1999.	Construction completed and major capacitor banks tested.	Readiness for operations in July 2001 and first experiments in September 2001; environmental assessment for relocating to Nevada Test Site (DOE 2001e).	Atlas physically moved to Nevada Test Site by end of December 2002.
	Ten of 28 outfalls eliminated from NPDES permit during 1997-1998.	Thirteen outfalls eliminated from NPDES permit; 9 of 13 transferred to Los Alamos County (Sandoval 2000).	Outfall 03A-199 added to permit for future Laboratory Data Communications Center.		
		Funding approved for Central Health Physics Calibration Laboratory at TA-36.			
			High-Pressure Tritium Facility (TA-33-86) in safe shutdown mode.	High-Pressure Tritium Facility (TA-33-86) in safe shutdown mode.	High-Pressure Tritium Facility (TA-33-86) underwent decontamination, decommissioning, and demolition (DOE 1998h).

Table 2.16.1-1. Non-Key Facilities Construction and Modifications (continued)

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK [a]	2001 YEARBOOK	2002 YEARBOOK
			Cerro Grande Fire impacted 86 structures or buildings, damaged 31 structures or buildings, and destroyed 10 structures or buildings.		
				Environmental assessment and design prepared for Emergency Operations Center (DOE 2001f).	Construction started.
				Environmental assessment prepared for Multichannel Communications Project (DOE 2001f).	Design and acquisition in process.
					Environmental assessment for Omega West Reactor Facility; demolition activities began in July 2002 (DOE 2002f).
				Security Systems Group (S-3) Security Systems Support Facility at TA-03: NEPA categorical exclusion issued (DOE 2001g).	Design and construction began.
					Decision Applications Division Office Building at TA-03.NEPA categorical exclusion issued and construction began (DOE 2002g).
				LANL Medical Facility at TA-03: NEPA categorical exclusion issued (DOE 2001h).	Design and construction began.
				Chemistry Division Office Building at TA-46: NEPA categorical exclusion issued (DOE 2001i).	Construction began and was completed; occupancy granted in November 2002.

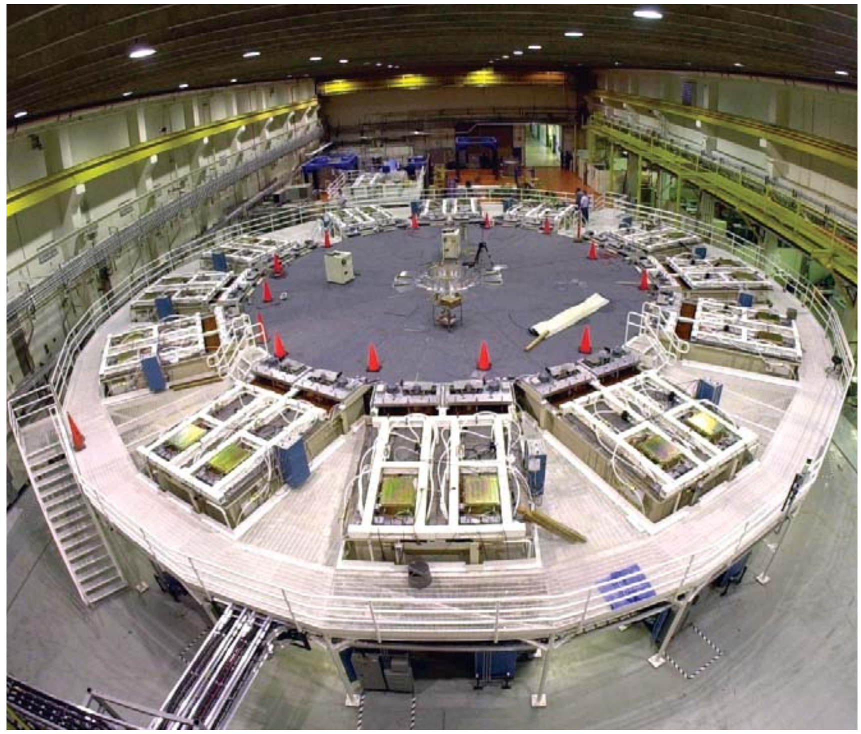
Table 2.16.1-1. Non-Key Facilities Construction and Modifications (continued)

SWEIS ROD PROJECTION	ACTUAL CONSTRUCTION AND MODIFICATION				
	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK [a]	2001 YEARBOOK	2002 YEARBOOK
				MST Office Building at TA-03: NEPA categorical exclusion issued (DOE 2001j).	Construction began.
				TA-72 Live Fire Shoot House: NEPA categorical exclusion issued (DOE 2001d).	Construction began.
					Security Truck Inspection Station: NEPA categorical exclusion issued, constructed, and operational (DOE 2002h).
					TA-41-30 and front of TA-41-4 demolished.

[a] Additional information on the impacts of the Cerro Grande Fire can be found in Section 2.16.4.

a) Atlas

Description: Atlas was constructed in parts of five buildings at TA-35 (35-124, 125, 126, 294, and 301). Atlas is being used for research and development in the fields of physics, chemistry, fusion, and materials science that will contribute to predictive capability for the aging and performance of primary and secondary components of nuclear weapons. The heart of the Atlas facility is a pulsed-power capacitor bank that will deliver a large amount of electrical and magnetic energy to a centimeter-scale target in less than ten microseconds. Each experiment will require extensive preparation of the experimental assembly and diagnostic instrumentation.



The completed Atlas facility

The facility will require up to 5 megawatt hours of electrical energy annually (less than one percent of total LANL consumption); will have a peak electrical demand of 4 megawatts for about one minute per week; and will employ about 15 people. This facility has its own NEPA coverage provided by Appendix K of the *Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management* (DOE 1996j).

Status: Construction was completed in September 2000. Major testing of the capacitor banks (level of current) was successfully completed in December 2000. Critical Decision 4 (authorization to commence operation) was received from DOE in March 2001. An Independent Verification Panel process was completed to assure readiness for operations in July 2001, and the first experiments were performed in September 2001.

Status: During 2002, a new building was constructed at the Nevada Test Site to accommodate the relocation of Atlas. The relocation of Atlas to Nevada Test Site had its own NEPA coverage in the form of an environmental assessment and Finding of No Significant Impact issued 06/05/2001 (DOE 2001e). Atlas was physically moved out of LANL at the end of December 2002. All of the equipment is currently located at the Nevada Test Site. The formal property transfer of Atlas from LANL to Bechtel/Nevada is in progress and is expected to be completed in March or April 2003. The schedule for reassembly and recommissioning of Atlas estimates that this capability should be operational in Nevada by October 2003. LANL personnel will continue to be involved in experimentation activities at the Nevada Test Site.

b) Los Alamos Research Park

Description: As described in the environmental assessment (DOE 1997e), the Los Alamos Commerce and Development Corporation will develop a maximum of 44 acres into a Research Park located along West Jemez Road, across from Otowi Building and the Wellness Center, and along West Road, in the vicinity of the ice rink. According to the Research Park Master Plan, up to five buildings and two parking structures may be constructed, with a total floor space of 300,000 square feet and parking for 1,400 cars. If five buildings were to be constructed, the Research Park would consume an estimated 1.3 megawatts peak electric demand, 4,250 megawatt-hours of electricity, 39 billion BTU of natural gas, and 17 million gallons of water annually. This consumption would represent approximate increases of 1 percent, 5 percent, 4 percent, and 18 percent in these utilities, respectively. The Park could also provide up to 1,500 new jobs and would increase traffic by up to 3,000 vehicle trips per day. Development would convert 30 undeveloped acres to office and light industrial use. This area, less than 0.25 percent of the vegetated landscape at LANL, currently provides a buffer for residential areas. This project has its own NEPA coverage provided by the Environmental Assessment for the Lease of Land for the Development of a Research Park at Los Alamos National Laboratory (DOE 1997e) along with a Finding of No Significant Impact.

Status: Construction of the first building in the Research Park began in February of 2000 and was completed in March of 2001. Occupancy of the building began in June 2001. In March of 2003, with the exception of a few single office suites, the entire first building is leased. LANL's operations at the Research Park are based on partnerships between industry collaborators and various Laboratory groups. These groups stand to benefit from industry-related research and, by their joint activities, help foster economic development in Los Alamos County.

c) Strategic Computing Complex (renamed Nicholas C. Metropolis Center for Modeling and Simulation)

Description: The SCC houses one of the world's fastest supercomputers. It is a three-story structure with 267,000 square feet under roof. About 300 designers, computer scientists, code developers, and university and industrial scientists occupy the building. The building was connected to existing sewer, water, and natural gas lines, but required a new 115/13.8-kilovolt substation transformer at the TA-03 power plant. Three cooling towers were constructed, expandable to six if needed.

The SCC will require an estimated 63 million gallons of cooling water per year. This water is proposed to come from treated waters from the sewage facility, which total more than 100 million gallons annually. The SCC is projected to have a maximum electricity load requirement of seven megawatts, or about 10 percent of total LANL demand. This amount of cooling water and electricity is what is anticipated when the facility has all of the computers installed that it was designed to accommodate. That will probably take several years. When the "Q" machine is completely installed, it will fill about half of the computer room. Another computer will probably be installed a few years later.

The Nonproliferation and International Security Center (left) and the Strategic Computing Complex

This project had its NEPA coverage provided by the Environmental Assessment for the Proposed Strategic Computing Complex, Los Alamos National Laboratory, Los Alamos, New Mexico (DOE 1998g). This proposal was an allowable interim action, and the NEPA review proceeded separately from the SWEIS. Based on the environmental assessment, DOE issued a Finding of No Significant Impact in December 1998.

Status: Construction of this new building got underway in 1999 and continued on schedule through 2000 and 2001. At the end of 2001, construction was complete and items on the final punch list were being addressed. Occupancy began in December 2001 and was completed in 2002.

d) Nonproliferation and International Security Center

Description: The NISC is a four-story building plus basement of 164,000 square feet with a capacity to house 465 people. It is being constructed adjacent to the new SCC within TA-03. The building will have laboratories, a machine shop for fabrication of satellite parts, a high-bay fabrication area, an area for the safe handling of sealed radioactive sources, and offices. Building heating and cooling will be by closed-loop water systems.

Because all occupants are to be relocated from other LANL buildings, there is no expected increase in quantities of sewage, solid wastes, or chemical wastes, nor should there be increased demand for utilities. To accommodate both the SCC and NISC, nearby parking lots are to be expanded to accommodate an additional 800 to 900 vehicles.

Status: NEPA review for the NISC project was provided by the Environmental Assessment for the Nonproliferation and International Security Center (DOE 1999j) and a Finding of No Significant Impact. Design of the building began in 1999 and continued through 2000. Construction started in March 2001, and the building was enclosed in May of 2002. Interior work is progressing. Occupancy began in March 2003.

e) Emergency Operations Center

Description: The Cerro Grande Fire demonstrated several inadequacies within the current Emergency Operations Center and Multi-Channel Communications capabilities. The fire showed that the Emergency Operations Center has outlived its useful life. Further research showed that upgrading it would be neither economical nor practical, and the decision was made to have a new Emergency Operations Center designed and built.

Status: During CY 2001, the conceptual design was completed and the final design was initiated. Also during 2001, an environmental assessment (DOE 2001f) was prepared to address both the Emergency Operations Center and the Multi-Channel Communications. With the current schedule, the Emergency Operations Center is expected to be operational by September 30, 2003.

f) Multi-Channel Communications Project

Description: The Multi-Channel Communications Project addresses communication vulnerabilities made evident in the Cerro Grande Fire. The new communications and information systems will provide flexibility to communicate between the LANL Emergency Operations Center and external entities to respond to future emergencies with the most up to date information. The conceptual design was received in 2001 and procurement of long lead items was initiated. Also during 2001, an environmental assessment (DOE 2001f) was prepared to address both the Emergency Operations Center and the Multi-Channel Communications.

Equipment for the Radio Upgrade to increase the number of channels to 15 has been received and will be installed during CY 2003 at the Communications, Computing, and Networking site on Pajarito Mountain. The Multi-band Radio System, which allows the Emergency Operations Center to communicate with outside agencies, was received, programmed, is functional and will be installed in the Emergency Operations Center.

Exterior and interior views of the Mobile Communications Van

The Mobile Communications Van was received; its radios have been programmed and it has been formally placed into service by Emergency Management and Response.

The Media Interface System and Emergency Alert System equipment were procured and set up by the Public Affairs Office. This equipment will be moved into the new Emergency Operations Center building for use by Emergency Operations Center and Public Affairs personnel. LANL now has the capability to produce press releases directly and transmit to local television stations as well as generate emergency banners.

The Portable Monitoring System, which will provide emergency response personnel remote monitoring capability, was ordered as well as the associated chemical and radiological sensors. Chemical sensors were received and tested. The robot will be delivered mid FY 2003 and will be transferred to Emergency Management and Response personnel after acceptance testing.

The contract was awarded for procurement and installation of Electronic Message Signs, Video Surveillance, and Video Database Interface equipment. This system will give the Emergency Operations Center the capability to view and remotely record video of LANL property and emergency response and to inform and direct traffic through the use of electronic message signs. Excavation permits were reviewed and approved for electronic sign installation. Approval was obtained from the Meteorology and Air Quality

Group to use existing meteorological towers to mount CCTV equipment and approval was given by DOE-Albuquerque to utilize wireless communications to transmit real-time video to the Emergency Operations Center. All CCTV equipment and electronic signs will be field-installed mid FY 2003 and monitoring and programming equipment will be installed in the Emergency Operations Center.

The Data Mirror task demonstrated the feasibility of MaxResponder emergency response software on a Predator ruggedized laptop. Laptops were ordered for installation in LANL and Los Alamos County emergency vehicles. Databases were identified for inclusion in the Data Mirror system at the Emergency Operations Center. The clustered, high-availability server system was procured and installed in the Central Computing Facility (CCF) for database population. Full database population and user interfaces will occur in FY 03 and computing equipment will be moved to the Emergency Operations Center.

Status: The Multi-Channel Communications Project received CD-3 in May of 2002 and was 48 percent complete as of the end of January 2003. The project is progressing on the anticipated schedule and is 14. percent under budget. It is estimated that final equipment installations will be complete by October 1, 2003.

g) S-3 Security Systems Support Facility (S-3 Facility)

Description: The mission of the Security Systems group (S-3) is to design, install, and maintain physical security systems in order to provide detection and deterrence of security violations. S-3 also designs, implements and maintains the software systems that protect nuclear material and control intrusion detection. S-3 provides access control systems, access area training, fire protection integration, and interior and perimeter intrusion detection systems.

The S-3 Facility project (TA-03-1409) is located on the south side of TA-03, along Pajarito Road, immediately west of the existing Security Division Complex. The new S-3 Facility will be a two-story building with parking for approximately 95 vehicles. This project consolidates the S-3 organization into a single facility designed to meet the long-term needs of the group's activities. S-3 is currently occupying space in six transportable buildings, and buildings SM-30 and SM-142. The primary mission of this project is to improve efficiency by consolidating personnel and activities to meet increasing LANL demands for physical security systems, as well as the increase in facility revitalization and reinvestment.

This project utilizes the design/build approach and has two distinct phases: 1) project development and procurement and 2) execution of the design/build contract. The building is to be designed to LANL technical standards and all other applicable codes and standards. The design-build contract will include complete and operational building systems (i.e., electrical, HVAC, potable water, sanitary sewer, fire protection, telephone, computer/communication systems, and furniture). The project accommodates physical security systems design; fabrication; maintenance; operations; data control; testing of security components; logistical support, to include receiving/warehousing; light electrical laboratory and machine shop operations; and supporting administration. The size of the completed facility will be 20,400 square feet, accommodating over 63 employees.

Status: NEPA categorical exclusion #8612 was issued by NNSA/DOE on December 04, 2001 (DOE 2001g). Design of the building began in 2002. The contract was awarded in June 2002 and construction started in July 2002. The building is currently enclosed and interior work is progressing. Construction for this facility is scheduled to be complete in May 2003 with occupancy scheduled for June 2003.

h) Decision Applications Division Office Building

Description: The Decision Applications Division Office Building project will provide replacement office space for this division. The Design/Build contractor will provide a two-story, 24,813-square-foot building that will house 100 Decision Applications Division personnel. This project will allow the division

Decision Applications Division Office Building under construction

to consolidate functions and employees within close physical proximity and allow for two "temporary" structures to be excessed and decommissioned and demolished the following fiscal year.

The project milestones are as follows: NEPA Categorical Exclusion #8595 was issued by NNSA/DOE on February 22, 2002 (DOE 2002g); the contract was awarded in May 2002; the design was completed in September 2002; construction started in September 2002 and is projected to be substantially complete in June 2003; occupancy is expected to begin in November 2003.

Status: Construction is underway and progressing rapidly. The building footings and concrete placement for the elevator are complete, and fire protection and water lines have been installed. The project is poised to complete the foundation and begin structural steel erection in April 2003. The project is approximately four weeks ahead of schedule with a small positive cost variance of $54,000. It is expected that the project will hold on to the positive variances and finish ahead of schedule.

i) LANL Medical Facility

Description: Employee health is monitored to assure the effectiveness of site health and safety programs and hazard control plans in protecting employees. The Occupational Medicine Program provides the DOE with operational assurance that regulatory requirements are being met, that employees are fit (both physically and psychologically) to perform work at LANL, and that mission activities are not harming our workers. The new facility will consolidate functions from three sites (TA-53, TA-63, and TA-03) and will support Occupational Medicine functions to include human reliability, medical survey and certification evaluations, illness/injury management, and epidemiology.

This project will construct an approximately 20,000-square-foot structure employing a pre-engineered building with interior design to specifically support DOE/NNSA and LANL requirements for occupational medicine certification, monitoring, intervention, and quality control. The building will house 60 medical staff personnel and support approximately 2,500 patients per month. The project replaces existing non-permanent facilities that have exceeded their life expectancy and are rapidly deteriorating to the point that their condition is currently impacting delivery of medical programs.

Status: The project received NEPA coverage through Categorical Exclusion #8398, approved May 30, 2001 (DOE 2001h). The design/build subcontract was awarded in September 2002. Construction start was in October 2002. Work in 2002 was limited to preparation of the temporary parking lot that involved excavation for site preparation and leveling, removal of asphalt from the building site, and placement of the millings in the temporary lot. Most of the effort in CY 2002 was focused on developing the design. Construction activities for site demolition and preparation, foundation, and underground utilities are continuing. The baseline schedule projects that construction will be complete in September 2003 with operational status by January 2004.

j) Chemistry Division Office Building (Chemistry Technical Support Building)

Description: As a result of the Cerro Grande Fire, over 200 employees were displaced due to the fact that their office trailers were destroyed or severely damaged by fire. As such, the housing of LANL employees in fire-susceptible trailers is a demonstrated vulnerability. Damage to permanent structures in the same areas during the Cerro Grande Fire was much less severe and limited mostly to smoke damage and damage due to electrical fluctuations. The new Chemistry Technical Support Building was built to house displaced scientists and technicians from burned buildings within TA-46. To provide permanent office space for displaced employees and to further decrease the present number of office trailers at LANL, this permanent office building has been constructed at TA-46, one of the sites to suffer the greatest loss of building space. The new two-story, 18,000-square-foot office building is located outside the fence at TA-46. This General Plant Project will provide vital support for surrounding LANL Buildings 30, 31, and 154. The new building is office space only. No hazardous or radiological materials will be involved in the project.

Status: The project received its own NEPA coverage by Categorical Exclusion # 8044 issued February 28, 2001 (DOE 2001i). Construction began in August 2002 and was completed in November 2002. Occupancy was granted in November 2002.

Chemistry Technical Support Building

k) Materials Science and Technology Office Building

Description: This project is consistent with LANL's long-range vision to group materials science activities together in the southeast quadrant of TA-03. The new Materials Science and Technology Office Building project location is west of the Sigma Complex security fence. The MSL and the other permanent buildings comprising the materials science complex are all located adjacent to the site proposed for this new office building and a common circulation pattern for that area will be implemented.

This General Plant Project will replace 17 trailers located to the east of 03-1819 and 03-2002 with a multistory office building. This modern, sustainable facility will dramatically reduce operational costs compared to those associated with the "temporary" structures. The project will provide the Materials Science and Technology Division with a new office building to house approximately 80 staff currently working in a cluster of "temporary" trailers and transportable structures in the materials science complex in TA-03. The installation of numerous "temporary" structures has proven inefficient over the years because of the high operational costs in addition to the fact that these facilities do not provide an effective work environment. Consequently, these facilities are detrimental to recruitment and retention of personnel.

Status: The project received its own NEPA coverage by Categorical Exclusion # 8618 issued December 07, 2001 (DOE 2001j). Construction of the new office building began in November 2002. The estimated completion date is September 2003. Occupancy is scheduled to begin in October 2003.

l) TA-72 Live Fire Shoot House

Description: PTLA currently provides security support for LANL and its environs. Their mission requires PTLA support to be trained to a high state of security readiness and to be able to respond to any emergency situation relative to the security of LANL. The purpose of the newly constructed Live Fire Shoot House is to provide an environment of the safe and realistic conduct of advanced tactical training for the PTLA. In addition, this General Plant Project enables LANL security officers to satisfy all DOE requirements for training and Live Fire Shoot House qualifications. Prior to construction of the Live Fire Shoot House in 2002, all training activities were conducted at the firing ranges at TA-72 with the exception of the Live Fire Shoot House training and qualifications that were conducted at offsite facilities. This consolidation of PTLA training activities into one location will result in a substantial cost savings for the PTLA training program, a more efficient use of personnel, and a more effective means of complying with DOE and LANL training requirements.

Live Fire Shoot House

The Live Fire Shoot House facility is an entirely lead-free structure installed on a reinforced concrete pad at TA-72. The facility consists of ballistic-resistant, steel-walled 60-foot by 76-foot modular structure. The entire house and concrete pad are covered with a steel-framed roof structure, similar to a metal building but open on four sides, to protect the facility from the weather and to permit training in inclement weather. Exterior and interior walls consist of 4-foot-wide by 12-foot-high modular panels. These walls are designed to contain the bullets and fragmentation from multiple impacts. Bullet traps are placed in the Live Fire Shoot House as the primary impact target for rounds fired. These traps are constructed of armor steel that cannot be penetrated by handgun rounds and can withstand 5.56-mm, full-metal jacket rounds.

The Live Fire Shoot House has an elevated observation control platform which is essentially a catwalk constructed over a portion of the house to allow instructor monitoring and evaluation of the training. This catwalk is accessed by a set of stairs adjacent to the exterior of the house. The stairway was built to Occupational Safety and Health Administration safety specification; the stairs and the elevated observation control platform have appropriate guardrails.

NEPA review for this project was provided under ESH-ID 97-0130 Shooting House/Concrete Pad and ESH-ID 98-0168 Live Fire Shoot House. NEPA coverage for the project was finally provided by Categorical Exclusion # 7245 issued on 03/16/2000 (DOE 2000e).

Status: Construction of the new Live Fire Shoot House began in November 2002 and was completed in January 2003. The facility became operational in March 2003.

m) Security Truck Inspection Post

Description: In an emergency response to the events that occurred on 9-11, security at LANL has been enhanced to protect our valuable assets—our personnel, property, and projects. One such security upgrade was the installation of the Truck Inspection Post (Post 10) on East Jemez Road just west of State Road 4. The purpose of this post is to screen all large vehicles coming into LANL to ensure they have the proper authority to be on DOE property. This post was initially established on the upper end of East Jemez Road near the Transit Mix Plant as an immediate response to 9-11. The permanent location of the post is now on the lower end of East Jemez Road.

When a truck stops at this post, the drivers are checked for identification and transportation invoices to ensure their destination is, and should be, LANL. At this post, if the paperwork is in order, the truck is issued a one-time pass that will permit access through other LANL SECON Posts between the Truck Inspection Post and the truck's destination.

Trucks that show up at SECON Posts at LANL without this pass or a valid DOE Standard or LANL-issued badge are turned around and sent back to the Truck Inspection Post. If the drivers can provide the necessary credentials, the truck is then issued a pass that authorizes its passage through SECON Posts to the destination LANL facilities.

Status: The project received its own NEPA coverage by Categorical Exclusion # 8726 issued March 11, 2002 (DOE 2002h). The permanent Truck Inspection Post was installed in March 2002 and became operational in April 2002.

n) NPDES Outfall Project

During 1997 and 1998, 10 of 28 outfalls from the Non-Key Facilities were eliminated from the NPDES permit. Waters from eight of these have been routed to the sewage plant at TA-46; discharges from the other two were eliminated. During 1999, 13 outfalls from Non-Key Facilities were eliminated from the NPDES permit. Responsibility for nine of the 13 was transferred to Los Alamos County when the County assumed ownership of water supply wells, pumping stations, storage tanks, and piping. Discharges from the remaining four outfalls were eliminated when the source activities were eliminated and were associated with water supply wells that were removed from service. Coupled with the 10 outfalls deleted during 1997 and 1998, a total of 24 of 27 outfalls from the Non-Key Facilities have been eliminated. Although Outfall 13S is still listed as an outfall, 13S serves the sanitary wastewater treatment plant at TA-46. Instead of discharging to Mortandad Canyon, however, treated waters are pumped to TA-03 for re-use and ultimate discharge through Outfall 001 into Sandia Canyon. This transfer has resulted in projected NPDES volumes underestimating actual discharges from the existing outfall. In 2000, a new outfall, Outfall 03A-199, was added to the NPDES permit. Although there was no discharge in 2000, 2001, or 2002, Outfall 03A-199 is to accommodate the future Laboratory Data Communications Center. Currently, there are a total of 21 permitted outfalls at LANL; five of these are in Non-Key Facilities. The SWEIS ROD projected a total of 55 LANL outfalls, 22 at Non-Key Facilities.

Outfall sampling

2.16.2 Operations at the Non-Key Facilities

Non-Key Facilities are host to seven of the eight categories of activities at LANL (DOE 1999a, pp. 2-2 through 2-9) as shown in Table 2.16.2-1. The eighth category, environmental restoration, is discussed in Section 2.17. During the 1998–2002 timeframe, no new capabilities were added to the Non-Key Facilities and none of the eight was deleted.

Table 2.16.2-1. Operations at the Non-Key Facilities

CAPABILITY	EXAMPLES
1. Theory, modeling, and high-performance computing.	Modeling of atmospheric and oceanic currents. Theoretical research in areas such as plasma and beam physics, fluid dynamics, and superconducting materials.
2. Experimental science and engineering.	Experiments in nuclear and particle physics, astrophysics, chemistry, and accelerator technology. Also includes laser and pulsed-power experiments (e.g., Atlas).
3. Advanced and nuclear materials research and development and applications	Research and development into physical and chemical behavior in a variety of environments; development of measurement and evaluation technologies.
4. Waste management	Management of municipal solid wastes. Sewage treatment. Recycle programs.
5. Infrastructure and central services	Human resources activities. Management of utilities (natural gas, water, electricity). Public interface.
6. Maintenance and refurbishment	Painting and repair of buildings. Maintenance of roads and parking lots. Erecting and demolishing support structures.
7. Management of environmental, ecological, and cultural resources	Research into, assessment of, and management of plants, animals, cultural artifacts, and environmental media (groundwater, air, surface waters).

In 1998, workforce size increased appreciably for the Non-Key Facilities and accounted for almost all of the 1,415 new workers at LANL since 1995. This increase is due to the fact that activities at the Non-Key Facilities consist largely of research and development, services, and administration. The increase in research and development reflected the ebb and flow that is typical of funds and interest in research. Increased research required more scientists, more support services, and a higher level of administration.

The LANL workforce increased by 404 employees during 1999. This brought the total workforce up to 12,412 employees, or 1,061 more employees than were anticipated under the ROD. Approximately 27 percent of these new employees were either JCNNM (17 percent) or PTLA (10 percent). This reflects the new construction going on at LANL and the increased efforts in security upgrades as LANL moves forward with its assignments for Stockpile Stewardship and Management. Approximately 40 percent of these new employees were regular (full-time and part-time) UC employees, of which about 40 percent were assigned to the Non-Key Facilities.

The 12,015 employees at the end of CY 2000 are 664 more employees than SWEIS ROD projections of 11,351. The 12,380 employees at the end of CY 2001 are 1,029 more employees than SWEIS ROD projections of 11,351. The 13,524 employees that comprise the total LANL-affiliated workforce at the end of CY 2002 are 2,173 more employees than the SWEIS ROD projection of 11,351. SWEIS ROD projections were based on 10,593 employees identified for the index year (employment as of March 1996). About 60 percent of this increase is in the Non-Key Facilities as a result of increases in research and development, services, and administration.

The 5,243 employees in the Non-Key Facilities at the end of CY 2002 reflect an increase of 427 employees over the 4,816 employees reported in the 2001 SWEIS Yearbook (LANL 2002i).

2.16.3 Operations Data for the Non-Key Facilities

Even though the Non-Key Facilities occupy more than half of LANL and employ more than half the workforce, activities in these facilities generally contribute less than 20 percent of most operational effects. For example, the 534 cubic meters of LLW constituted only 7 percent of the LANL total LLW volume in 2002. Also in 2002, the Non-Key Facilities generated approximately 56 percent of the total LANL chemical waste. Table 2.16.3-1 presents details of the operations data from 1998–2002.

Radioactive air emissions from stacks at the Non-Key Facilities (290 curies in 2002) were less than a third of the SWEIS ROD projections. The radioactive air emissions of 1,000 curies in 2001 were slightly above SWEIS ROD projections. This represents off gassing from inactive facilities and their cleanup activities and represents less than 5 percent of the 21,700 curies projected by the SWEIS ROD.

The combined flows of the sanitary waste treatment plant and the TA-03 steam plant account for about 77 percent of the total discharge from Non-Key Facilities and about 73 percent of all water discharged by LANL. Section 3.2 has more detail. Operations data are summarized in Table 2.16.3-1.

2.16.4 Cerro Grande Fire Effects at the Non-Key Facilities

The Non-Key Facilities received significant fire damage. The Cerro Grande Fire impacted 86 structures or buildings, damaged 31 structures or buildings, and destroyed 10 structures or buildings. Like the rest of LANL, operations were shut down during the emergency, and these programs suffered lost work time. Access was restricted in several of the more severely burned areas at LANL, and employees who occupied the damaged or destroyed structures had to be housed in new locations. In addition, the fire destroyed data, work-in-progress, and work production at many locations, delaying some of the programs.

Table 2.16.3-1. Non-Key Facilities/Operations Data

PARAMETER	UNITS	SWEIS ROD	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Radioactive Air Emissions: [a]							
Tritium	Ci/yr	9.1E+2	5.66E+2	9.5E+2	1.15E+3	1.0E+3	2.9E+2
Plutonium	Ci/yr	3.3E-6	None measured	None measured [b]	None measured [b]	None measured [b]	None measured [b]
Uranium	Ci/yr	1.8E-4	None measured	None measured [b]	None measured [b]	None measured [b]	None measured [b]
NPDES Discharge:							
Total Discharges	MGY	142	95	232	192	99.01	130.827
001 (TA-03)	MGY	114			170	98.75	101.3200
013S (TA-03)	MGY	[c]	[c]	[c]	[c]	[c]	[c]
03A-027 (TA-03)	MGY	5.8			8.7	0.13	6.6070
03A-160 (TA-35)	MGY	5.1			14	0.13	22.9000
03A-199 (TA-03)	MGY	---	0 [d]	0 [d]	0 [d]	0 [d]	0 [d]
03A-042 (TA-46)	MGY	5.30	No discharge	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
04A-118 (TA-54)	MGY	1.10	No discharge	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999
04A-166 (TA-05)	MGY	0.01	No discharge	No observation	Eliminated 1999	Eliminated 1999	Eliminated 1999
03A-038 (TA-33)	MGY	5.80	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
04A-171 (National Forest)	MGY	0.00	No discharge	No discharge	Eliminated 1999	Eliminated 1999	Eliminated 1999
04A-172 (National Forest)	MGY	0.00	No discharge	No discharge	Eliminated 1999	Eliminated 1999	Eliminated 1999
04A-173 (National Forest)	MGY	0.00	No discharge	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999
04A-174 (National Forest)	MGY	0.00	No discharge	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
04A-175 (National Forest)	MGY	0.00	No discharge	No observation	Eliminated 1999	Eliminated 1999	Eliminated 1999
04A-176 (National Forest)	MGY	0.66	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999
04A-177 (National Forest)	MGY	0.06	No discharge	No observation	Eliminated 1999	Eliminated 1999	Eliminated 1999
03A-034 (TA-21)	MGY	0.26	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
03A-035 (TA-21)	MGY	0.04	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
04A-182 (TA-21)	MGY	0.00	Active	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
04A-186 (TA-21)	MGY	0.18	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999
06A-132 (TA-35)	MGY	5.80	No discharge	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
03A-025 (TA-03)	MGY	0.18	Active	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
04A-164 (TA-18)	MGY	0.01	No discharge	No observation	Eliminated 1999	Eliminated 1999	Eliminated 1999
06A-106 (TA-36) [e]	MGY	0.58	No discharge	Eliminated 1999	Eliminated 1999	Eliminated 1999	Eliminated 1999
04A-161 (TA-72)	MGY	1.00	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999
03A-148 (TA-03)	MGY	6.30	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
04A-094 (TA-03)	MGY	5.30	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997
04A-163 (TA-72)	MGY	6.20	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999
04A-165 (TA-72)	MGY	2.00	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999

Table 2.16.3-1. Non-Key Facilities/Operations Data (continued)

PARAMETER	UNITS	SWEIS ROD	1998 YEARBOOK	1999 YEARBOOK	2000 YEARBOOK	2001 YEARBOOK	2002 YEARBOOK
Wastes:							
Chemical	kg/yr	651,000	1,506,392	765,395	367,768	1,254,680 [f]	334,348
LLW	m^3/yr	520	386	350	2,781 [g]	569	534
MLLW	m^3/yr	30	55.4 [h]	2.5	10.1	9.4	8.7
TRU	m^3/yr	0	0	0	2.7	24.8	36.8
Mixed TRU	m^3/yr	0	0	15	63	0	0.21
Number of Workers	FTEs	6,579 [i] 4,601 [i]	4,547 [i]	4,601 [i]	4,501 [i]	4,816 [i]	5,243 [i]

[a] Stack emissions from previously active facilities (TA-33 and TA-41); these were not projected as continuing emissions in the future. Does not include non-point sources.

[b] Most of the stacks in the Non-Key Facilities are not sampled for radioactive airborne emissions because the potential emissions from these stacks are sufficiently small that measurement systems are not necessary to meet regulatory or facility requirements.

[c] Outfall 013 is from the TA-46 sewage plant. Instead of discharging to Mortandad Canyon, however, treated waters are pumped to TA-3 for re-use and ultimate discharge through Outfall 001 into Sandia Canyon. This transfer of water has resulted in projected NPDES volumes underestimating actual discharges from the exiting outfall.

[d] New Outfall 03A-199 was permitted by the EPA on 2/1/2001 for the future Laboratory Data Communications Center. It had no discharge during 2000, 2001, or 2002.

[e] Outfall 03A-106 was incorrectly associated with the Non-Key Facilities in the SWEIS. Starting with the 2002 Yearbook, Outfall 03A-106 is accounted for with High Explosives Testing.

[f] Approximately 73,449 kilograms of the chemical wastes are construction and demolition debris (previously indicated in the Yearbooks as industrial solid wastes) resulting from cleanup following the Cerro Grande Fire. The construction and demolition debris is nonhazardous, may be disposed of in county landfills, and does not represent a threat to local environs.

[g] The CY 2000 LLW was generated from D & D activities and from soil and sediment removal from Mortandad and Los Alamos Canyons.

[h] The CY 1998 MLLW was generated as a result of soil and asphalt removal from MDA-L construction activities.

[i] The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY 1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, JCNNM, and other subcontractor personnel. The number of employees for CY 1998 through CY 2002 operations is routinely collected information and represents only UC employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.17 Environmental Restoration Project

The ER Project may generate a significant amount of waste during cleanup activities; therefore, the project is included as a section of Chapter 2. The SWEIS ROD forecast that the ER Project would contribute 60 percent of the chemical wastes, 35 percent of the LLW, and 75 percent of the MLLW generated at LANL over the 10 years from 1996–2005. The ER Project will also affect land resources in and around LANL.

The DOE established the ER Project in 1989 to characterize and remediate over 2,100 PRSs known, or suspected, to be contaminated from historical operations. Many of the sites remain under DOE control; however, some have been transferred to Los Alamos County or to private ownership (at various locations within the Los Alamos town site). Remediation and cleanup efforts are regulated by and coordinated with the NMED and/or DOE.

In 2002, ER Project activities included drafting and finalizing several characterization and remediation reports for NMED, conducting characterization and remediation field work on numerous sites, and formally tracking all work performed.

Some cleanups included

- Interim Action at the TA-53 north impoundment, which included the removal of 5,000 cubic yards of contaminated material;
- removal of 1,500 cubic feet of contaminated soil at the TA-16-260 outfall; and
- source removals at TA-21 and TA-54.

Continued field investigations included

- drilling and installation of five groundwater monitoring wells (R-14, R-16, R-20, R-23, and R-32);
- sampling at PRS 03-052(a)-00;
- four rounds of well sampling and two rounds of biota sampling to monitor natural attenuation and to support the ER Project's collaboration with San Ildefonso Pueblo; and
- completion of sediment, alluvial groundwater, and surface water sampling in Los Alamos/Pueblo Canyon.

2.17.1 Operations of the Environmental Restoration Project

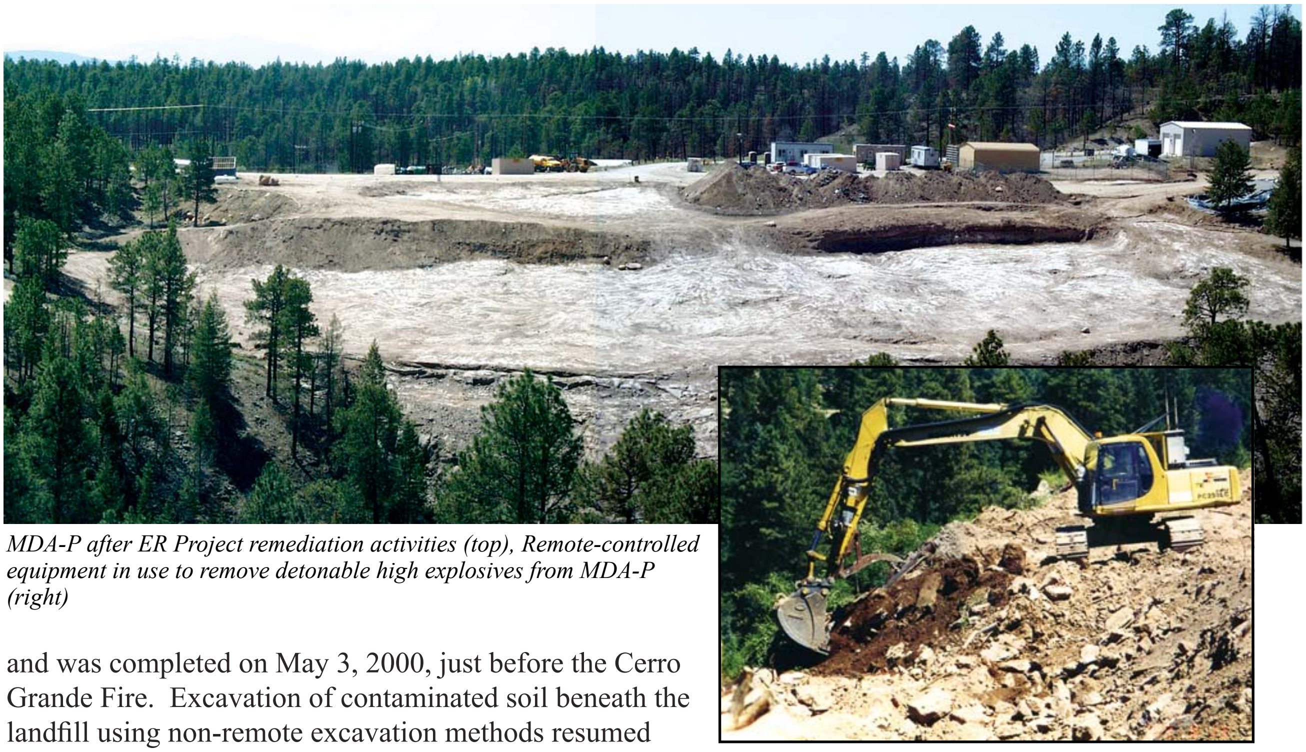
The ER Project originally identified 2,124 PRSs, consisting of 1,099 PRSs administered by NMED and 1,025 PRSs administered by DOE. By the end of 2002, only 833 discrete PRSs remain. Approximately 694 units have been approved for no further action (NFA)[8], 139 units have been removed from the Laboratory's Hazardous Waste Facility Permit, and 48 units proposed for NFA in previous permit modification requests are pending approval by NMED.

Of the 139 total PRSs removed from the permit, no sites were removed in 2002. Additionally, in 2002, one new PRS was identified and nine additional PRSs were proposed to the NMED for NFA.

Completion of MDA-P

The completion of remediation activities at MDA-P was a major accomplishment for the ER Project. MDA-P is located at TA-16 on the south rim of Cañon de Valle on the western edge of LANL. The MDA-P Landfill began receiving waste from the S-Site Burning Grounds in 1950. Debris from World War II–era buildings was also disposed of at MDA-P. Operation of the landfill was suspended in 1984. ER Project personnel began the closure process at the landfill in 1997. The presence of detonable high explosives in the landfill required the use of a robotic excavator. Remote excavation of the landfill began in February 1999

[8] NFA means that the site is considered "clean" for its intended purpose. An industrial site would not be cleaned up to the same level as a residential site.



MDA-P after ER Project remediation activities (top), Remote-controlled equipment in use to remove detonable high explosives from MDA-P (right)

and was completed on May 3, 2000, just before the Cerro Grande Fire. Excavation of contaminated soil beneath the landfill using non-remote excavation methods resumed after the fire and was completed in March 2001. Phase II confirmatory sampling and geophysics measurements began in June 2001. During Phase II sampling, additional contamination was found, which was excavated and shipped off-site for disposal. All waste disposal was completed at MDA-P in February 2002. Phase II confirmation sampling was also completed in the spring of 2002. More than 52,500 cubic yards of soil and debris were excavated from MDA-P. Waste material included hazardous and industrial waste and recycled material. Waste types and amounts generated included

- 387 pounds of detonable high explosive,
- 820 cubic yards of hazardous waste with residual levels of radioactive contamination,
- 6,600 pounds of barium nitrate,
- 2,605 pounds of asbestos,
- 200 pounds of mixed waste,
- 235 cubic feet of LLW, and
- 888 containers that underwent hazardous categorization characterization.

TA-53 North Impoundment

Three lagoons at TA-53 were constructed in 1969 to collect excess sanitary, radioactive, and industrial wastewater. The wastewater came from various LANSCE activities as well as septic tank sludge from other LANL activities. The lagoons operated until 1998, when the southern lagoon was replaced by a new liquid wastewater treatment facility at TA-53. The southern lagoon was remediated by the ER Project in 2000, and the two northern lagoons were remediated in 2002.

The two northern lagoons were 210 feet long, 210 feet wide, and 6 feet deep, and each could store 1.6 million gallons. The lagoons worked via evaporation. The radioactive wastewater was first pumped into storage tanks to allow short-lived radioisotopes to decay away and then was pumped into the lagoons to evaporate.

The sludge and water in the lagoons and surrounding area were sampled and analyzed in four separate sampling events. The DOE conducted the first in 1988, then LANL conducted several in 1991/1992, 1994/1995, and 1999/2000. The contaminants of potential concern found included cobalt-60, cesium-134, strontium-90, sodium-22, and tritium. Other inorganic and organic chemicals identified were lead, mercury, and polychlorinated biphenyls.

Approximately 5,000 cubic yards of contaminated material (sludge and clay liner) from the two northern lagoons were removed in 2002. The sludge and clay liners contained radioisotopes (e.g., cobalt-60 and cesium-134) and carcinogens (Aroclor-1260) at levels exceeding the target levels of 15 millirem per year for dose and 10^{-5} risk. One hundred and fifty-nine waste bins were filled with northeast lagoon waste and 230 waste bins from the northwest lagoon. Approximately 90 cubic yards of soil were removed from the lagoons outfall area located on the eastern side. Miscellaneous debris, from a previous interim action, filled another three waste bins.

Lagoon remediation efforts almost completed at LANSCE

Source Removals

A voluntary corrective action (VCA) was performed at the Burn Ground North as part of the MDA-P closure activities during FY 2002. VCAs were also completed at areas of concern (AOCs) 21-030 and C-21-015, and at solid waste management unit (SWMU) 54-007(a). Additionally, approximately 1,500 cubic feet of contaminated soil was removed and site restoration was completed at the TA-16-260 outfall. All contaminated soils were removed and disposed of in accordance with applicable EPA, NMED, DOE, and LANL requirements. VCA completion reports were prepared for AOCs 51-001 and 54-007(d), SWMU 54-007(c)-99, and the Los Alamos Area Office Land Transfer Tract (which included PRSs 0-003, 0-012, and 0-030(i)) and submitted to the appropriate administrative authority (NMED for Hazardous and Solid Waste Amendment [HSWA] PRSs, and DOE for non-HSWA PRSs) with a recommendation for NFA. NMED concurred with the recommendation for NFA at the Los Alamos Area Office Land Transfer Tract for the two HSWA PRSs, based on a review of the VCA completion report. DOE also concurred with the recommendation for NFA for the one non-HSWA PRS.

Continued Field Investigations

The ER Project continued investigations in several areas during FY 2002, including the following:

- completed four rounds of well sampling and two rounds of biota sampling to monitor natural attenuation and to support the ER Project's collaboration with San Ildefonso Pueblo,
- completed the drilling and installation of one monitoring well, R-13. Additionally, the ER Project completed the report on hydrologic tests at characterization wells R-9i, R-13, R-19, R-22 and R-31;

completed geochemistry reports on R-15, R-9/9i, R-19, and R-12; and produced well completion reports for R-22 and R-7,
- completed well installation and hydrological testing at well CdV-R-37-2,
- completed sediment, alluvial, and surface water field investigations in Los Alamos/Pueblo Canyon,
- completed accelerated sampling at PRS 03-052(a)-00, and
- completed geophysical investigations at PRS 03-010(a).

2.17.2 Operations Data for the Environmental Restoration Project

Waste quantities generated from FY 1998 through FY 2002 are shown in Table 2.17.2-1. The ER Project generated 1,047 kilograms of chemical waste (including the categories RCRA, Toxic Substances Control Act [TSCA], and New Mexico Special Waste) in FY 2002—all below the projections made by the SWEIS ROD.

Table 2.17.2-1. Environmental Restoration Project/Operations Data

WASTE TYPE	UNITS	SWEIS ROD	YEARBOOK				
			1998	1999	2000	2001	2002
Chemical [a]	kg/yr	2,000,000	143,913	14,629,792 [b]	26,185,341 [c]	25,815,571 [c]	1,132,780
LLW	m^3/yr	4,260	744	286	226	621	5,484
MLLW	m^3/yr	548	9.2	1.25	577 [d]	28.86	0
TRU	m^3/yr	11	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0.2	0

[a] The chemical waste volume includes the categories of RCRA, TSCA, and New Mexico Special Waste.
[b] The chemical waste volume is higher than that projected in the SWEIS ROD because of extensive amounts of soil disposed of by the cleanup of MDA P.
[c] The chemical waste volume includes industrial solid waste and other chemical waste generated during the recovery efforts from the Cerro Grande Fire.
[d] The MLLW volume includes 574.5 cubic meters of MLLW generated as a result of emergency cleanups following the Cerro Grande Fire.

2.17.3 Cerro Grande Fire Effects on the ER Project

From 2000

The major concern following the Cerro Grande Fire was the threat of erosion at burned over PRSs and the movement of contaminants downstream. The ER Project began an assessment of the 600 PRSs within the burn area to accomplish the following:

- **Evaluate and stabilize sites touched by fire.** The PRS Assessment Team determined that over 300 PRSs were touched by fire. Assessments for these PRSs were completed by May 23, 2000, and, as shown in Table 2.17.3-1, erosion control measures (called best management practices) were needed for 91 of the 300 PRSs. These best management practice installations were completed on July 15, 2000, and included contour raking, placement of water barriers (straw wattles), diversion of stream channels, and other measures to divert surface water from the PRS.

Table 2.17.3-1. Evaluated and Stabilized PRSs following the Cerro Grande Fire

NO. OF PRSs	PRS LOCATIONS	START DATE	COMPLETION DATE
10	TA-11	5/21/00	5/24/00
29	TA-06, 09, 14, 15, 22, 36, 40, 49	6/14/00	7/15/00
34	TA-16, 46, 15, (R-44)	5/29/00	7/15/00
18	TA-04, 05, 42, 48	6/27/00	7/15/00

- **Conduct baseline sampling to characterize post-fire, pre-flood conditions (i.e., before monsoon season rains) in fire-impacted watersheds.** The Contaminant Transport Team completed a Baseline Characterization Sampling Plan on June 24, 2000. Pre-flood fieldwork, including collection of sediment, surface water, and alluvial groundwater samples, was completed on July 14, 2000. Post-flood fieldwork was carried out in August and September of 2000, as necessary.

- **Evaluate, stabilize, or remove sites subject to flooding.** The Accelerated Actions Team identified 77 PRSs in fire-impacted canyons that were potentially vulnerable to post-fire flooding. The majority of these sites were in Los Alamos Canyon (TA-2 and TA-41) and Pajarito Canyon (TA-18 and TA-27) and included outfalls, storm drains, septic systems, and other structures (including those associated with the Omega West Reactor at TA-2). Few of the sites assessed actually required corrective actions except for several in TA-2 where excavation, soil removal, and site restoration activities were completed during July and August 2000.

In addition, one flood-impacted sediment deposition area and five fire-impacted sites were identified that required corrective actions to remove debris or contaminated soils. ER Project personnel completed accelerated actions at the following sites:

- Los Alamos Canyon, “Garden Plot”: excavation of 765 cubic meters of low-level radioactively contaminated soil, waste removal, and site restoration,
- TA-16, MDA-R: excavation and waste removal,
- TA-15, R-44 firing site surface disposal area: debris removal,
- TA-36 surface disposal area: debris removal,
- TA-40 surface disposal area: debris removal, and
- TA-16 “silver” outfall: removal of contaminated soil and stabilization of drainage channel.

MDA-R

MDA-R (a 2.25-acre site) is located in TA-16, north of TA-16-260 (high explosives machining building) and south of Cañon de Valle. It lies on level terrain with a moderate-to-steep slope to the north, dropping off 80 feet into the canyon. MDA-R ignited during the Cerro Grande Fire and continued to burn for over two weeks.

Historically, MDA-R was a burn ground and waste disposal site for S-Site’s weapons experiments from the mid-1940s until the early 1950s, probably 1951. Initially, waste materials were burned in an open field at MDA-R; later, three U-shaped bermed pits (75 feet by 75 feet) were constructed for burning. High explosives scrap was collected, broken up, and burned in these pits. When the 260 Line was constructed, the berms and the surface soil at MDA-R were graded northward into Cañon de Valle. A 1992 inspection of MDA-R revealed the presence of oil cans, glass vials, metal structures, and coaxial cables below MDA-R on the south side of the canyon.

During the week of May 15, 2000, LANL personnel observed that MDA-R was smoldering, noting that tree roots, tree trunks, railroad ties, and cabling were burning. Over the next two weeks, emergency personnel attempted to extinguish the fire; first with fire-suppression foam, and later with water. However, the site continued to burn beneath the surface. Ultimately, it was decided that the fire could only be extinguished by excavation of the burning material. Using a remote excavator (a remotely controlled, fully functioning back hoe with mounted television survey cameras), burning material was uncovered and extinguished using a low-pressure water stream from a fire hose. The remote excavator was required because of the possibility that unexploded high explosives were present in MDA-R. The last embers in MDA-R were extinguished on August 31, 2000.

MDA-R was prioritized for accelerated corrective action because of concerns that erosion might lead to contaminant migration. Wastes removed from the site included approximately 1,960 cubic yards of soil, 175 pounds of barium nitrate pieces, and 300 pounds of friable asbestos. Erosion control activities included stabilization of spoils piles, stabilization of canyon slopes, and redirection of a small drainage arroyo that previously conducted surface water runoff through the landfill. For more information regarding this activity see the ER Project's *Project Completion Report for the Accelerated Action at TA-16, MDA-R* (LANL 2001s).

Los Alamos Canyon Cleanup

In late June 2000, a cleanup of contaminated sediment was conducted in Los Alamos Canyon following the Cerro Grande Fire to address the potential for these sediments to be eroded and transported during possible large floods resulting from high-intensity summer precipitation. The sediments removed were situated within three discrete areas immediately below the confluence with DP Canyon. The contamination within these sediments consisted primarily of cesium-137 with lesser amounts of strontium-90, amercium-241, and plutonium. The contamination, at the remediation site and elsewhere in Los Alamos Canyon, is related predominantly to releases of effluent from Building 21-35 and 21-257 at TA-21 during the years 1952 to 1985. The location of the discharges is currently known as PRS 21-011(k). The contaminated sediments at the remediation site were deposited by floods that occurred during the early period of releases from PRS 21-011(k) (Katzman 2000).

The cleanup activity was triggered by several factors:

- the area of contaminated sediments was relatively susceptible to flooding and erosion under the hydrologic conditions caused by the fire,
- the contaminant concentrations in the remediation were significantly higher than surrounding sediments, and
- the area was easily accessible by heavy equipment necessary to remove the sediment.

A total of 720 cubic yards of material was removed from three discrete sub-areas within the remediation site. The waste was transported to TA-54, Area G, for disposal as LLW. Following remediation, this site was restored by back filling the excavation with clean fill material brought in from the Los Alamos County landfill. The area was then covered with jute matting and reseeded (Katzman 2000).

From 2001

One year has passed since the Cerro Grande Fire impacted the Los Alamos townsite and the Laboratory. Massive fire rehabilitation and flood mitigation efforts have been ongoing and will continue for several years until areas prone to erosion are stabilized. The Cerro Grande Fire put nearly 100 of the ER Project's PRSs at increased risk of contaminant release and/or transport, by virtue of either being directly burned, or vulnerable to increased surface water runoff or erosion. Since the fire, these sites have had controls installed and continue to be inspected and maintained as part of the Laboratory's overall storm water program.
For an update on the current status of the PRSs impacted by the Cerro Grande Fire go to http://lib-www.lanl.gov/pubs/laur01-4122.htm.

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